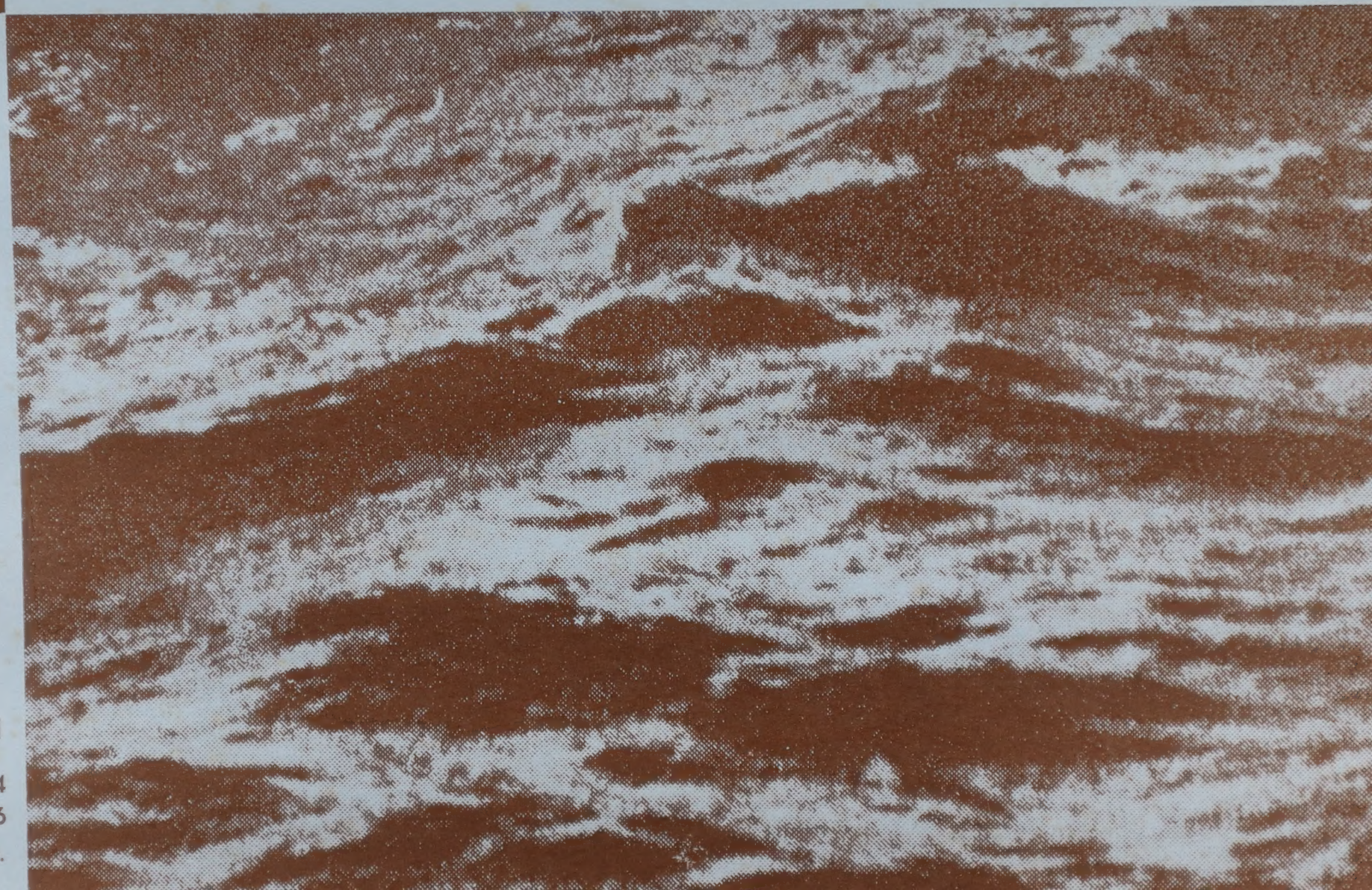
COMMERCE PUBLICATION

Commercial Fisheries Abstracts

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

13/8/71



JUNE 1971

VOLUME 24
NUMBER 6

Seattle, Wash.

UNITED STATES DEPARTMENT OF COMMERCE
Maurice H. Stans, *Secretary*

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
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FOREWORD

The Department of Commerce's National Marine Fisheries Service publishes the monthly journal *Commercial Fisheries Abstracts* as one means of communicating to the fishing industry and allied groups the status of current fishery research. The research includes the biological aspects of fishery science as well as technological studies dealing with aquatic resource supply, harvesting, processing, utilization, and distribution.

Commercial Fisheries Abstracts contains summaries of selected articles from trade, engineering, and scientific journals dealing with the entire spectrum of fishery science. The publication is designed to serve the needs of fishery scientists, engineers, and managers in industry, academic institutions, and government by supplying timely information on current progress in fishery research and technology.

13/8/71

0.321 (1.82) PARTICLE LENGTH AND STABILITY OF NATURAL F-ACTIN FROM ADDUCTOR MUSCLE OF THE CLAM, MERETRIX MERETRIX

Suzuki, S. (Department of Biophysics and Biochemistry, University of Tokyo, Meguro-ku, Tokyo, Japan), M. Kawamura, and K. Maruyama (Biological Institute, University of Tokyo)
Comparative Biochemistry and Physiology 38, No. 1A, 147-155 (January 1, 1971)

Using the method of Szent-Györgyi et al. (1970), the authors isolated F-actin directly from the adductor muscle of live clams; its purity was only about 20%. Electron micrographs of homogenized and of sonicated preparations showed a number of spherical particles about 250 Å in diameter. Although the authors could not identify the particles, they assumed that the 75S peak appearing in the sedimentation pattern may have been caused by these particles.

The F-actin was rather stable when incubated at 25° C. in 0.1 M KCl at pH 8.0 or in 0.04 M KCl at pH 6.0; it was very heterogeneous in particle length, the number-average length ([L]n) being 0.24 μ, the weight-average length ([L]w) 1.07 μ, and the [L]w/[L]n ratio 4.46. Following trypsin treatment (which, surprisingly, resulted in partial digestion of the F-actin particles), the [L]n, [L]w, and [L]w/[L]n became 0.27 μ, 0.57 μ, and 2.1, respectively. When the F-actin was sonicated, [L]n became 0.12 μ and [L]w 0.22 μ; after the sonicated F-actin had stood for 6 hr., these values were 0.15 μ and 0.33 μ, respectively.

[8 figures, 2 tables, 12 references] LB

0.35 ALLELOCHEMICS: CHEMICAL INTERACTIONS BETWEEN SPECIES

Whittaker, R. H., and P. P. Feeny (Section of Ecology and Systematics, Cornell University, Ithaca, N.Y. 14850)
Science 171, No. 3973, 757-770 (February 26, 1971)

In this article, the authors review a class of interactions termed allelochemic interactions. These interactions involve chemicals by which organisms of one species affect the growth, health, behavior, or population biology of organisms of another species. The chemical agents are considered under the following broad categories: Allelopathy in higher plants, Land plants and their enemies, Defense and attack in animals, Chemistry of secondary substances, Antibiotics and the soil system, Hosts and parasites, Ectocrines in aquatic communities, Autotoxicity and civilization, and Chemical evolution. The authors classify the interorganismic chemical effects as follows:

I. Allelochemic effects
   A. Allomones (give adaptive advantage to the producing organism)
      1. Repellents; 2. Escape substances; 3. Suppressants; 4. Venoms; 5. Inductants; 6. Counteractants; 7. Attractants
   B. Kairomones (give adaptive advantage to the receiving organism)
      1. Attractants; 2. Inductants; 3. Signals; 4. Stimulants
   C. Depressants (inhibit or poison the receiver without adaptive advantage to releaser from this effect)
II. Intraspecific chemical effects
   A. Autotoxins (are toxic to or inhibit individuals of the releasing populations, with or without selective advantage from detriment to some other species)

(over)

0.35 REACTIONS OF BIOLOGICAL ANTIOXIDANTS: III. COMPOSITION OF BIOLOGICAL MEMBRANES

Gruger, E. H., Jr. (Pioneer Research Laboratory, National Marine Fisheries Service, Seattle, Wash. 98102), and A. L. Tappel (Department of Food Science and Technology, University of California, Davis, Calif. 95616)
Lipids 6, No. 2, 147-148 (February 1971)

The authors present the results of their calculations of ratios of the unsaturated fatty acids in mitochondria to the total α-tocopherol (α-T) and coenzymes Q (CoQ) that have been reported for mitochondria. Interest in these results stems from earlier proposals that vitamin E and some part of the CoQ may function together as biological antioxidants. To judge the validity of the proposal, one must know the quantitative levels of the reactive compounds in such function. A significant part of the vitamin E and most of the CoQ are found in the mitochondria in highly active biological cells. From their calculations, the authors concluded that biological antioxidants are normally present at levels relative to unsaturated lipids that are adequate to protect such lipids in membranes from becoming peroxidized significantly in vivo. FTP

0.35 FERRICYTOCHROME c - I. GENERAL FEATURES OF THE HORSE AND BONITO PROTEINS AT 2.8 A RESOLUTION

Dickerson, Richard E., Tsunehiro Takano, David Eisenberg, Olga B. Kallai, Lalli Samson, Angela Cooper, and E. Margoliash (Norman W. Church Laboratory of Chemical Biology, California Institute of Technology, Pasadena, Calif. 91109; and the Department of Molecular Biology, Abbott Laboratories, North Chicago, Ill. 60064)
Journal of Biological Chemistry 246, No. 5, 1511-1535 (March 10, 1971)

Cytochrome c is an electron-carrying protein that occurs in mitochondria of all aerobic organisms. Cytochrome c is part of the terminal oxidation chain in which the breakdown of foods to CO_2 and H_2O is completed and the liberated chemical energy is stored in molecules of ATP (adenosine triphosphate). It is an iron porphyrin protein containing one heme group and one polypeptide chain. The iron atom alternates from the +2 to the +3 oxidation states as the molecule interacts in turn with cytochrome reductase and cytochrome oxidase, each involving a multimolecular complex. The authors state that one goal of the present X-ray study was to understand how electron transfer occurs into and out of cytochrome c; such information requires a knowledge of the molecular structure in the ferric and ferrous states. This paper describes the structure of the ferricytochrome c from horse and bonito hearts at a resolution of 2.8 A (angström).

The authors found that there was no difference in the structures of the ferricytochrome c from horse heart and from bonito heart, other than the expected changes in side chains where the amino-acid sequences differ. Apparently, the tertiary folding of cytochrome c has remained constant since the ancestors of mammals and fish diverged 400 million years ago, or even longer.

[20 figures, 7 tables, 86 references, appendix] FTP

0.33 THE LACTOSE-CASEIN (MAILLARD) BROWNING SYSTEM: VOLATILE COMPONENTS

Ferretti, Aldo, and Vincent P. Flanagan (Dairy Products Laboratory, Eastern Utilization Research and Development Division, ARS, U.S. Department of Agriculture, Washington, D.C. 20250)
Journal of Agricultural and Food Chemistry 19, No. 2, 245-249 (March-April 1971)

This paper reports data from a continuing study by Ferretti and his colleagues on the nonenzymatic browning of lactose-casein mixtures. The purpose of the study is to establish whether or not the Maillard reaction contributes to the development of off-flavors in milk and milk products. The present paper describes the isolation and identification of potentially flavor-significant compounds formed in a lactose-casein system during browning. Mass spectrometry and gas-liquid chromatography, primarily, were used to identify the compounds. The following compounds were isolated and identified: acrolein; cyclopentanone; 2-methyltetrahydrofuran-3-one; 3-hydroxy-2-butanone; acetol; acetol acetate; methylethylpyrazine; trimethylpyrazine; 2-furaldehyde; 2-furfuryl formate; C-4-alklypyrazine; tetramethylpyrazine; benzaldehyde; trimethylethyl- or 2,5-diethyl-3-methylpyrazine; 2,2′-bifuran; 1-(2′-furyl)-2-butanone; 2,2-dimethyl-4-hydroxymethyl-1,3-dioxolane; 2-acetylpyridine; 2-furfuryl vinylacrylate; N-methyl-2-formylpyrrole; 2-methylbenzofuran; 1-(2′-furyl)-3-butanone; N-methyl-2-acetylpyrrole; acetophenone; 4-methyl-2-butenoic acid γ-lactone; 3-4-dimethyl-2-butenoic acid γ-lactone; 5-methyl-2-propionylfuran; N-methyl-2-pyrrolidinone; propiophenone; 2-methyl-5-(5′-methyl-2′-furfuryl)furan; benzyl alcohol; methyl 2-thiofuroate; 2,3-dimethyl-2-butenoic acid γ-lactone; phenol; difurfuryl ether; 2-formylpyrrole; 5-(2′-furfuryl)-2-furaldehyde; 5-hydroxymethyl-2-furaldehyde; 5-(2′-furfuryl)-2-furfuryl alcohol; 2-(2′-furfuryl)-5-(2′′-furfuryl)-furan.
[1 figure, 1 table, 48 references]

FTP

0.321 DISC ELECTROPHORESIS OF WEBER-EDSALL EXTRACT AND ACTOMYOSIN FROM SKELETAL MUSCLE

Rampton, J. H., A. M. Pearson, J. E. Walker, and J. G. Kapsalis (Department of Food Science, Michigan State University, East Lansing, Mich. 48823)
Journal of Agricultural and Food Chemistry 19, No. 1, 238-240 (March-April 1971)

The paper describes the separation of Weber-Edsall extract and actomyosin from skeletal muscle by acrylamide gel electrophoresis in 7 M urea before and after reduction of SH-groups with dithiothreitol (DTT) or reaction with sulfite. Such information is needed to help elucidate the role of the various myofibrillar proteins upon the physical properties of meat and meat products.

By avoiding heavy metal contamination and prolonged exposure to atmospheric oxygen, inconsistency and heterogeneity in electrophoretic patterns of Weber-Edsall extract could be largely overcome. The Weber-Edsall extract could be stabilized, also, by adding an equal weight of sucrose. The authors found that unreduced Weber-Edsall extract separated into "stationary" and "slow" myosin, two tropomyosin bands, a diffuse actin band, troponin, and two minor bands. Reduction of the Weber-Edsall preparation with DTT effectively sharpened the actin band and eliminated one tropomyosin and one minor band, apparently by inhibiting protein interactions. Disc electrophoresis of unreduced actomyosin produced a similar pattern to that of unreduced Weber-Edsall extract, except that one minor band occurred for rabbit preparations and two for beef preparations. Apparently, DTT reduction of actomyosin was inconsistent, resulting in altered and less repeatable electrophoretic patterns. [2 figures, 14 references]

FTP

0.35 SYNAPTIC TRANSMISSION IN THE CRAYFISH: INCREASED RELEASE OF TRANSMITTER SUBSTANCE BY BACTERIAL ENDOTOXIN

Parnas, I., R. Reinhold, and J. Fine (Department of Neurology, College of Physicians and Surgeons, Columbia University, New York, N.Y.; and Harvard Surgical Unit, Boston City Hospital, Boston, Mass. 02118)
Science 171, No. 3976, 1153-1155 (March 19, 1971)

The authors studied the effect of endotoxin on nerve function. The data show that bacterial endotoxin increases the frequency of miniature excitatory postsynaptic potentials, decreases facilitation, and increases the evoked excitatory postsynaptic potential without changing membrane resistance. Apparently, the endotoxin acts on the presynaptic nerve terminal by increasing the amount of transmitter substance released in response to an applied stimulus.
[2 figures, 1 table, 14 references]

FTP

0.35 CONFORMATIONAL EQUILIBRIA IN SPIN-LABELED HEMOGLOBIN

Beal, Walter J., Susan G. Mohlman, and Marcia L. Sprang (Department of Chemistry, University of California, Riverside, Calif. 92502)
Science 171, No. 3976, 1147-1149 (March 19, 1971)

A component characteristic of deoxyhemoglobin appears in the paramagnetic resonance spectrum of spin-labeled oxyhemoglobin, and vice versa. The component appears under conditions of pH and ionic strength consistent with the interpretation that the spectrum is sensitive to the conformational equilibrium of the carboxy-terminal histidines.
[1 figure, 15 references]

FTP

0.35 OSCILLATOR NEURONS IN CRUSTACEAN GANGLIA

Mendelson, Martin (Department of Physiology and Biophysics, New York University School of Medicine, New York, N.Y. 10016, and Marine Biological Laboratory, Woods Hole, Mass. 02543)
Science 171, No. 3976, 1171-1173 (March 19, 1971)

Apparently, the motor rhythm of ventilation in hermit crabs and lobsters is controlled by a pair of neurons, one in each half of the subesophageal ganglion. Their membrane potentials oscillate; upon depolarization and hyperpolarization, they elicit spiking in two pools of motor neurons on each side, without spikes in the oscillator neurons themselves. The author states that the fact that higher order (command) interneurons can control the rate of the oscillator by means of a smoothly graded input lends support to the idea that oscillator neurons respond periodically to a constant tonic stimulus.
[2 figures, 12 references]

FTP

0.35

B. Adaptive autoinhibitors (limit the population to numbers that do not destroy the host or produce excessive crowding)
C. Pheromones (are chemical messages between members of a species)

[6 figures, 1 table, about 387 references]

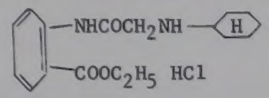
FTP

0.39 (2.5)(9.17) STUDIES ON ANESTHETICS FOR FISH

Hirata, Miyoshi, Sumiro Isoda, Munefumi Kanao, Hiroya Shimizu (Research Laboratories, Daiichi Seiyaku Co., Ltd., Edogawa-ku, Tokyo, Japan), and Shin-ichi Inoue

Bulletin of the Japanese Society of Scientific Fisheries 36, No. 11, 1127-1135 (November 1970)

Anesthetics are widely used on fish that are to be transported, tagged, or investigated in the laboratory. A desirable fish anesthetic has the following characteristics; it should anesthetize the fish within a matter of minutes; it should be effective on both marine and fresh-water fish; it should be effective at low water temperatures; it should be highly soluble in both marine and fresh water; and the fish should be able to recover quickly and completely from its effects. The authors have synthesized an anthranilic ester that exhibits these characteristics--namely,



LB

[6 figures, 9 references]

0.5 ANTIGENIC RELATIONSHIPS AMONG THE PROTEOLYTIC AND NONPROTEOLYTIC STRAINS OF CLOSTRIDIUM BOTULINUM

Solomon, H. M., R. K. Lynt, Jr., D. A. Kautter, and T. Lilly, Jr.
Applied Microbiology 21, No. 2, 295-299 (February 1971)

Previous work has shown that nonproteolytic strains of Clostridium botulinum types B, E, and F are similar in their physiological characteristics, but there is little information on the antigenic relationship among them. Therefore, the present study was carried out to determine the relationship between the somatic antigens of proteolytic and nonproteolytic strains of a given toxigenic type, to determine whether an antigenic relationship exists among the nonproteolytic strains of types B, E, and F, and to confirm the relationship among the somatic antigens of the proteolytic strains of types A, B, and F. Other Clostridium species were included in this study. Tube agglutination and agglutinin absorption tests were used.

A relationship existed by which strains of C. botulinum are grouped by their proteolytic capacity rather than by the type of specific toxin produced. Accordingly, C. botulinum type E and its nontoxigenic (nonproteolytic) variants share common somatic antigens with the nonproteolytic strains of types B and F. Also, absorption of antiserum of a strain of any one type with antigen of any of the others removes the antibody to all three types. Similarly, C. botulinum type A shares somatic antigens with the proteolytic strains of types B and F, and absorption of any one antiserum with an antigen of either of the other two types removes the antibody to all three types. The authors found partial cross-agglutination of C. sporogenes, C. tetani, and C. histolyticum with the somatic antisera of the proteolytic group. [5 tables, 17 references] FTP

0.39 (1.9)(8.59) STEROIDS OF A CHONDROSTEAN: IDENTIFICATION OF INTERNAL TISSUE IN THE AMERICAN ATLANTIC STURGEON, ACIPENSER OXYRHYNCHUS MITCHELL, BY HISTOLOGICAL AND HISTOCHEMICAL METHODS

Idler, D. R., and M. J. O'Halloran (Fisheries Research Board of Canada Halifax Laboratory, P.O. Box 429, Halifax, Nova Scotia, Canada)
Journal of Endocrinology 48, No. 4, 621-626 (December 1970) (Cambridge University Press, 32 East 57th Street, New York, N.Y. 10022)

The authors studied the anatomical distribution and the histology of the adrenocortical tissue of two male and one female sturgeon. In addition, they studied the tissue's steroidogenic potential, using the hydroxysteroid-dehydrogenase technique for demonstrating the presence of 3β-, 3α-, 11β-, 20β-, and 20α-hydroxysteroid dehydrogenases (HSD).

The histology of the yellow bodies scattered throughout the kidney tissue and posterior cardinal veins of the sturgeon resembled that of interrenal tissue rather than that of corpuscles of Stannius. The 3β-HSD activity in the yellow bodies was intense when dehydroepiandrosterone and pregnenolone were used as substrates. When androsterone was the substrate, the 3α-HSD activity was very weak; and when cortisol and corticosterone were the substrates, 11β-HSD activity was nonexistent. No 20α- or 20β-HSD activity was observable when 20α- and 20β-hydroxyprogesterone were used, respectively, as substrates. The authors conclude that the numerous yellow bodies scattered throughout the sturgeon's kidney and posterior cardinal veins are true interrenal tissue.

[1 figure, 1 table, 4 plates, 17 references] LB

0.6 (0.8) [PROCESS CONTROL]

Hughes, P. et al.
Food Manufacture 45, No. 11, 57-68 (November 1970)

"Basic Instrument and Process Control Technology," by P. Hughes (Taylor Instrument Companies (Europe) Ltd.), pp. 57-61.

Since food processing is a large-volume, low-return industry, maintenance of volume production without variation in the product is necessary. Process control instrumentation gives the processor this performance. In addition, it allows him to use semiskilled labor in many areas of the plant; it permits him to convert from small batch to continuous or semicontinuous processing; and it can give him a permanent record of his processing conditions.

Process instruments are commonly used to measure and control temperature, pressure and vacuum, level and flow of liquids, acidity and alkalinity, moisture, and density and strength of solutions. The author explains the basic principles of these instruments in terms of control technology so that food manufactures can gain a background understanding of the services that instrumentation engineers can provide them. [18 figures, 3 photographs]

"Continuous Measuring Techniques for Process Control," by H. A. Slight (British Food Manufacturing Industries Research Assoc., Randalls Road, Leatherhead, Surrey), pp. 61-64.

Productivity will increase and quality will be better and more consistent in most processes if automatic controls are correctly applied. Measuring devices are

(over)

0.39 (1.9)(8.59)

STEROIDS OF A CHONDROSTEAN: IN-VITRO STEROIDOGENESIS IN YELLOW BODIES ISOLATED FROM KIDNEYS AND ALONG THE POSTERIOR CARDINAL VEINS OF THE AMERICAN ATLANTIC STURGEON, ACIPENSER OXYRHYNCHUS MITCHELL

Idler, D. R., and G. B. Sangalang (Fisheries Research Board of Canada Halifax Laboratory, P.O. Box 429, Halifax, Nova Scotia, Canada)
Journal of Endocrinology 48, No. 4, 627-638 (December 1970)

In this report, the authors present direct evidence of steroidogenesis by sturgeon tissue. The enzymes necessary for steroid transformation and cleavage of the cholesterol side-chain are present in the yellow bodies they isolated from the kidneys and from along the posterior cardinal veins.

When the sturgeon's yellow bodies were incubated with [16-^{3}H]pregnenolone and [4-^{14}C]progesterone, cortisol was formed in yields of 54.3% of the ^{3}H and 55.1% of the ^{14}C precursor activities. Although double-labeled cortisone, corticosterone, 11-deoxycortisol, 17α-hydroxyprogesterone, and progesterone were isolated as transformation products, the yields were much lower. No 11-deoxycorticosterone, aldosterone, or 1α-hydroxycorticosterone was detected.

When the yellow bodies were incubated with [7-^{3}H]cholesterol, pregnenolone (0.43%), progesterone (0.091%), 17α-hydroxyprogesterone (0.023%), cortisol (0.061%), cortisone (0.004%), corticosterone (0.001%), and 11-deoxycortisol (0.047%) were isolated as labeled transformation products. In this instance, too, no 11-deoxycorticosterone, aldosterone, or 1α-hydroxycorticosterone was detected.

The authors identified all the steroid products by their isopolarity with authentic steroids. Their identification method was repeated chromatography and recrystallization of free steroids or their derivatives, or both (after addition of authentic radio-inert steroids), to constant ^{3}H:^{14}C isotype ratios.
[1 figure, 2 tables, 21 references] LB

0.39 (1.89)

KINETICS OF THE REACTION OF OCTOPUS VULGARIS HEMOCYANIN WITH OXYGEN

Brunori, Maurizio (Centre for Molecular Biology of the C.N.R., Institute of Biochemistry, University of Rome and Regina Elena Institute for Cancer Research, Rome, Italy)
Journal of Molecular Biology 55, No. 1, 39-48 (January 1, 1971) (Academic Press Inc., 111 Fifth Avenue, New York, N.Y. 10003)

Using the temperature-jump relaxation method, the author investigated the kinetics of the reaction of octopus hemocyanin with oxygen. He was able to fit the relaxation spectrum with two relaxation processes, characterized by two time constants, the faster relaxation time, τ_1, reflecting a bimolecular step and the slower, τ_2, reflecting a coupled monomolecular process. The dependence of the two relaxation times on the concentration of the reactants can be represented by

$$O_2 + Hc \underset{k_{-1}}{\overset{k_1}{\rightleftharpoons}} HcO_2 \underset{k_{-2}}{\overset{k_2}{\rightleftharpoons}} Hc\ O_2^*$$

where Hc is hemocyanin and the asterisk differentiates between the two forms. The four rate constants (k_1, k_{-1}, etc.) were determined and tabulated.

Even in the absence of cooperative phenomena, oxygen binding by octopus hemocyanin involved a minimum of two elementary steps. This finding led the author to hypothesize the presence of two metal atoms in each site. He therefore compared the reaction with copper of some of the simple respiratory proteins (myoglobin, α and β hemoglobin chains, hemerythrin, and hemocyanin) of horse, man, marine worm (Sipunculus), and octopus.
[6 figures, 3 tables, 26 references] LB

0.6 (0.8)

the essential components of process control systems. This article describes some of the latest devices and techniques for the measurement of moisture, temperature, and viscosity and for the rapid, nondestructive determination of fat by low resolution nuclear magnetic resonance. [9 figures]

"Process Control and Instrumentation," Anonymous, pp. 65-68.

Among the dozen actual installations described are those in which an electronic system controls oven temperatures, a "building block" system offers low cost control, motorized valves improve material flow, fully automatic processing in a cannery doubles the output, and a computer-controlled materials-handling system blends soups. [4 photographs] LB

0.6 THE USE OF FUNGI AS FOOD AND IN FOOD PROCESSING

Gray, William D. (Department of Botany, Southern Illinois University, Carbondale, Ill.)
CRC Critical Reviews in Food Technology 1, No. 2, 225-329 (May 1970) (The Chemical Rubber Co., 18901 Cranwood Parkway, Cleveland, Ohio 44128)

Although fungi of various types have been widely used almost all over the world, either directly as food or as a means of processing food, their contribution to man's total food supply has been relatively small. The author suggests ways that their contribution to the world's protein pool can be increased.
[46 figures, 17 tables, 348 references] LB

0.5

ANALYSIS OF CLOSTRIDIUM BOTULINUM TOXIGENIC TYPES A, B, AND E FOR FATTY AND CARBOHYDRATE CONTENT

Fugate, Kearby J., Lydell B. Hansen, and Olivia White (Food and Drug Administration, Dallas District, Dallas, Tex. 75204, and the University of Texas, Southwestern Medical School, Dallas, Tex. 75235)
Applied Microbiology 21, No. 3, 470-475 (March 1971)

The purpose of this study was to characterize the lipid and carbohydrate content of whole cells of three representative strains of toxigenic Clostridium botulinum (type A, 62A; type B, 169B; type E, Beluga). Such information might be useful as a basis for differentiating the types of C. botulinum. Furthermore, because carbohydrates confer specificity to many bacterial cell components, information on whether C. botulinum vegetative cells contain carbohydrate moieties in the easily extracted lipid portion of their cell surface would be important from a physiological standpoint.

Lyophilized, 48-hr. log-phase vegetative cells were extracted with chloroform-methanol then with ethanol-ether. The extracted lipids were saponified with methanolic KOH. The methyl esters of the extractable fatty acids were examined by gas-liquid chromatography.

The chromatograms of the lipid extracts revealed distinctive "pattern profiles" of C. botulinum types "A," "B," and "E." The lipid extracts from C. perfringens and E. coli gave pattern profiles that were distinct from those obtained for the C. botulinum organisms.

Amino sugar content of the five microorganisms was determined with an amino-acid analyzer. The molar ratio of glucosamine to galactosamine was further useful in distinguishing the various microorganisms.
[3 figures, 2 tables, 27 references] FTP

0.7 (0.4) DYNAMIC UTILIZATION OF RECENT NUTRITIONAL FINDINGS: DIET AND CARDIOVASCULAR DISEASE

Rathmann, Dorothy M., J. Richard Stockton, and Daniel Melnick (Best Foods Research Center, CPC International Inc., Union, N.J.)
CRC Critical Reviews in Food Technology 1, No. 3, 331-378 (September 1970) (The Chemical Rubber Co., 18901 Cranwood Parkway, Cleveland, Ohio 44128)

Evidence shows that a fat-controlled diet retards atherogenesis and prevents or delays such complications as stroke and coronary heart disease. The food industry can translate this evidence into specific products, and has done so in many instances, as the patent literature demonstrates. Potential benefits of dietary modifications are weighed against risks, and obstacles to such changes are highlighted. [16 tables, 99 references] LB

1.30 (9.12)(9.3) DISTRIBUTION OF SALMON AND RELATED OCEANOGRAPHIC FEATURES IN THE NORTH PACIFIC OCEAN, SPRING 1968

French, Robert R., Richard G. Bakkala, Masanao Osako, and Jun Ito (National Marine Fisheries Service Biological Laboratory, Seattle, Wash. 98102)
Special Scientific Report--Fisheries No. 625, iii + 22 pp. (March 1971)

Japanese and United States research vessels made a cooperative research cruise. Differences in distribution of salmon were examined by species, by maturity, and by age group. Sockeye salmon, Oncorhynchus nerka, were in the more northerly waters and pink salmon, O. gorbuscha, in the more southerly waters, whereas chum salmon, O. keta, were more widely distributed and in all waters occupied by other species. The proportion of older ages decreased from north to south; immature sockeye and chum salmon were generally restricted to the more southern waters and maturing fish to the more northern waters.
[19 figures, 3 tables, 2 references] From Authors' Abstract

1.22 FURTHER STUDIES ON BLOOD PROTEIN POLYMORPHISM IN SPRAT

Naevdal, Gunnar (Inst. of Mar. Res., Bergen, Norway)
Fiskeridir. Skr. Havundersøk. 15, No. 5, 555-564 (1970)
Sport Fishery Abstracts 15, No. 4, Abstract No. 12618, 381 (1970)

About 3000 specimens comprising 29 samples of sprat have been analysed for hemoglobin and serum protein types. The samples were collected at different localities on the Norwegian coast, in Kattegat and the North Sea. The results of the samples from the coast confirm the results obtained by corresponding studies made before, i.e. great variations among samples, especially among samples from western Norway. The Kattegat samples coincided with part of the samples from western Norway, with most of the samples from the Skagerak coast and with one sample from the Oslo fjord. The samples from the North Sea also showed accordance with some of the samples from the Norwegian coast. The present and previous analyses indicate that the sprat population in Norwegian waters consists of one major component recruited from Kattegat and the North Sea, and minor components recruited from local spawning in the fjords. (Auth. summ.) Reprinted

1.95 (8.51) PINNIPED HEMOGLOBINS

Lincoln, D. R., D. J. Thompson, H. C. Schwartz, and T. J. Gribble (Stanford School of Medicine, Stanford, Calif.)
Clinical Research 19, No. 1, 209 (January 1971) (American Federation for Clinical Research, 6900 Grove Road, Thorofare, N.J. 08086)

Hypothetically, hemoglobins (Hb) of different oxygen affinity would be advantageous to deep-diving mammals. Therefore the authors characterized the Hb of six species of pinnipeds by starch-gel, cellulose-acetate, starch-block, and polyacrylamide-gel electrophoresis at pH 8.6. Of the two major components identified in all species, the mobility of the anodal one (consisting of from 47 to 81% of the Hb) seemed to be similar in all the animals; the mobility of the cathodal one (containing from 19 to 53% of the Hb) varied with the species. Both components in all species were denatured from 91 to 98% after 1 min. in alkali at pH 12.7; both were stable to heat--70 to 87% stable after 3 hr. at 50° C. Under Sephadex chromatography, the pinniped Hb eluted as a single peak well in advance of cytochrome c; it did not separate from HbA.

In addition to the two major components, all species had a minor band. Preliminary amino-acid analysis and fingerprint studies on the chains of the major components revealed amino-acid differences. The authors are continuing their investigations in order to determine the physiological significance of the two major Hb's and their chemical differences. LB

1.22 (8.59)

DISTRIBUTIONS OF MULTIPLE FORMS OF LACTATE DEHYDROGENASE, ASPARTATE AMINOTRANSFERASE AND SERUM ESTERASE IN HERRING FROM NORWEGIAN WATERS

Naevdal, Gunnar (Inst. of Mar. Res., Bergen, Norway)
Fiskeridir. Skr. Havundersøk. 15, No. 5, 565-572 (1970)
Sport Fishery Abstracts 15, No. 4, Abstract No. 12619, 381 (1970)

By use of combined starch and agar gel electrophoresis 10 samples (1258 specimens) were studied for serum esterase polymorphism, 13 samples (1454 specimens) for lactate dehydrogenase (LDH) polymorphisms and one sample (100 specimens) for aspartate aminotransferase (AAT) polymorphism. The samples were collected in Norwegian waters and the North Sea. In two groups of esterase (weak and strong components) and in LDH and AAT intraspecific, hereditable variations were observed. Frequencies of LDH and AAT phenotypes were found to be similar to corresponding frequencies observed in samples from Canadian waters. Statistically significant variations among samples were observed in distributions of the phenotypes, especially the esterase phenotypes. (Auth. summ.) Reprinted

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1.953 (8.59)

KARYOTYPES OF A MALE SPERM WHALE (PHYSETER CATODON L.) AND A FEMALE SEI WHALE (BALAENOPTERA BOREALIS LESS.)

Árnason, Úlfur (Institute of Genetics, University of Lund, S-223 62 Lund, Sweden)
Hereditas 64, No. 2, 291-293 (1970)

The author found a chromosome number of 2n = 42 in the 12 sperm whale cells that he counted. He found a chromosome number of 2n = 44 in the sei whale cells, the number for all species so far studied except the sperm whale. He notes that his findings differ in many respects from the karyotype and ideogram of the sei whale presented by Kasuya in 1966.
[2 figures, 4 references] LB

1.951 (8.59)

THE KARYOTYPE OF THE GREY SEAL (HALICHOERUS GRYPUS)

Árnason, Úlfur (Institute of Genetics, University of Lund, Sweden)
Hereditas 64, No. 2, 237-242 (1970) (The Distributor of Hereditas, J. L. Törnqvist, Book Dealers, S-261 22 Landskrona, Sweden)

The somatic chromosomes in the lung tissue of gray seals were studied, and their autoradiographic pattern is described. An ideogram was constructed from measurements of mitotic metaphases for 6 male and 14 female cells. The gray seal has the same chromosome number, 2n = 32, and apparently the same karyotype, as Pusa hispida and Phoca vitulina. Other karyological interrelationships among the species of the family Phocidae are discussed.
[4 figures, 2 tables, 6 references] LB

1.22 (9.12)

FACTORS INFLUENCING YEAR-CLASS STRENGTH OF NORWEGIAN SPRING SPAWNING HERRING (CLUPEA HARENGUS LINNÉ)

Dragesund, Olav (Inst. of Mar. Res., Bergen, Norway)
Fiskeridir. Skr. Havundersøk. 15, No. 4, 381-450 (1970)
Sport Fishery Abstracts 15, No. 4, Abstract No. 12617, 381 (1970)

Variation in year-class strength of Norwegian spring spawning herring is analysed in relation to the structure and the size of the spawning stock, the location and the time of spawning and environmental conditions during the egg stage and the early larval development with special reference to the 1959-1965 year classes.
(Auth. summ.) Reprinted

0.7

A CONSPECTUS OF RESEARCH ON PROTEIN REQUIREMENTS OF MAN

Irwin, M. Isabel (Human Nutrition Research Division, Agriculture Research Service, U.S. Department of Agriculture, Beltsville, Md. 20705), and D. Mark Hegsted (Department of Nutrition, Harvard School of Public Health, Boston, Mass. 02115)
Journal of Nutrition 101, No. 3, 385-429 (March 1971)

This article is a broad review of the past literature on studies relating to protein requirements of man. The purpose of this review was to (1) indicate the research basis for current dietary recommendations and (2) to indicate the areas in which further research would be most useful. The authors listed and described the various studies and the conclusions drawn. Some personal comments and evaluations were included. [373 references, appendix with 3 tables] FTP

1.85 (9.1)(9.16)

PROCEEDINGS OF THE WORLD SCIENTIFIC CONFERENCE ON THE BIOLOGY AND CULTURE OF SHRIMPS AND PRAWNS

Mistakidis, M. N. (ed.)
FAO Fisheries Reports No. 57, Vol. 4, pp. i + 1167-1627 (October 1970) (Rome, Italy)

This edition (Volume IV) contains the corrected synopses contributed to the World Scientific Conference on the Biology and Culture of Shrimps and Prawns, held in Mexico City, Mexico, from 12 to 21 June, 1967.

The first volume contained the Report of the Conference, the second volume the review, regional summary and some experience papers, while the remaining experience papers were included in the third volume.

The following species are covered: common shrimp (Crangon crangon Linnaeus); shrimp (Pandalus montagui Leach); jumbo tiger prawn (Penaeus monodon Fabricius); Indian prawn (Penaeus indicus H. Milne Edwards); prawn (Pandalus platyceros Brandt); penaeid prawn (Solenocera indica Nataraj); penaeid prawn (Matapenaeus dobsoni Miers); penaeid prawn (Metapenaeus affinis H. Milne Edwards); ocean shrimp (Pandalus jordani Rathbun); camarón blanco (Penaeus schmitti Burkenroad); white shrimp (Penaeus setiferus Linnaeus); brown shrimp (Penaeus aztecus aztecus Ives); pink shrimp (Penaeus duorarum duorarum Burkenroad); penaeid prawn (Metapenaeus monoceros Fabricius); penaeid prawn (Metapenaeus brevicornis H. Milne Edwards); penaeid prawn (Parapenaeopsis stylifera H. Milne Edwards); camarón nailon (Heterocarpus reedi Bahamonde).
[103 figures, 73 tables, 880 references] Reprinted in part

0.7

PROTEIN-ENRICHED BREAD

Pomeranz, Y. (Crops Research Division, Agricultural Research Society, U.S.Department of Agriculture, Madison, Wis.)
CRC Critical Reviews in Food Technology 1, No. 3, 453-478 (September 1970)

Among the subjects the author discusses are the enrichment of bread with nonwheat protein concentrates and glycolipids, supplementation of nonwheat bread with protein concentrates and amino acids, and enrichment of bread with wheat germ and phospholipids. [6 figures, 9 tables, 45 references] LB

2.1121 THE SMALLER FISHING BOAT
(2.1123)(2.114)

Noel, H. S.
World Fishing 20, No. 3, 64, 66-69 (March 1971)

About two-thirds of this article is a step-by-step description of the way to braid and rig a white-fish trawl. Used as a pair trawl, it can be fished by two boats of between 12 and 20 horsepower. When it is fished from a single boat, it must be rigged with otter boards, the source of much of a trawl's resistance; hence, the boat must have a more powerful engine. Both rigs are illustrated. Since the trawl has a 13-ft.-headline height, it will catch almost everything in its path. This feature plus the smallness of the boat from which it can be worked make it an attractive piece of gear for those inshore fishermen who aim for a mixed catch.

The author then speculates on the advisability of using smaller doors at increased towing speeds. He reasons that, since the water resistance of a towed body increases as the square of the speed, an increase of towing speed from 3 to 4 knots would increase drag about 56%--and the shearing effect of the doors proportionately. But, he believes, the increased drag of the trawl netting doesn't require such an increase in the shearing action of the doors, since, if it is excessive, it will cause the headline to pull down. If towing speed is increased by 25%, say, then smaller doors should be used--and he cites as example an acquaintence who gets a good spread with 2.5-ft.-long doors towed by a 30-hp. engine.

A line baiter designed by a fisherman in the Faroes is being underwritten by the British White Fish Authority. Briefly, it works as follows: the line and

(over)

2.140 TUNA GILL NETTING TRIALS CONTINUE OFF NEW ZEALAND
(1.120)

Avery, Max
World Fishing 19, No. 12, 20-21 (December 1970)

During the 1969-70 tuna-fishing season, the New Zealand Marine Department, working in close cooperation with commercial fishermen and big-game fishing clubs, conducted research into practical tuna fishing. The primary objects of the program were to establish the types and quantities of tuna that appear each season in the survey area and to find the most efficient methods of catching them in economical quantities. One of the secondary objects was to provide the lobster fishermen, who have suffered recently because of seriously depleted stocks, with a means of supplementing their income. So far the findings show that tuna can be gillnetted efficiently from boats no longer than 20 ft.; that acoustic lures will attract small schools of skipjack; that modified sonar buoys efficiently detect tuna; that chumming or baiting gill nets will substantially increase the catch of skipjack; and that lures made of different-colored strands of wool are not only cheap but extremely effective. The 1970-71 program will emphasize the tracking and attracting of tuna with sonar equipment. [3 photographs] LB

2.115 ADVANTAGES OF THE MAIERFORM SV-BOW

Greger, O.
World Fishing 19, No. 12, 16-17 (December 1970)

Since introduction some 3 years ago of the SV-bow developed by Maierform, about 100 ships of different sizes have been fitted with the bow. Its name comes from the S shape the stem presents side view and the V shape of the frames in its lower part. The bulb effect given by such a configuration influences the bow-wave system, reducing wave-making resistance by reducing the height of the bow wave, altering the way in which bow and stern-wave systems interfere, and delaying formation of eddies around the hull. Unlike conventional bulb designs, the SV-bow is effective at several drafts. As long as the water rises at its forward end and an overflow is produced over its upper part, the bow's bulb effect increases but when it emerges further and no overflow is produced, the improvement decreases. When it is completely immersed, its large mass has a hydrodynamic stabilizing effect, permitting a fishing vessel to operate under much worse weather conditions than can vessels with conventional bows.

A vessel owner can use the reduction in total resistance either to get more speed with the same horsepower or to maintain speed with less horsepower. The economic efficiency of two vessels fitted with the SV-bow is illustrated on the back. The power requirements of each--one a large fishery protection vessel (Lpp = 66.6 m., V = 2,140 $m.^3$) and the other a smaller fishery research ship (Lpp = 33.1 m., V = 450 $m.^3$)--are compared with those of vessels operating without the SV-bow.

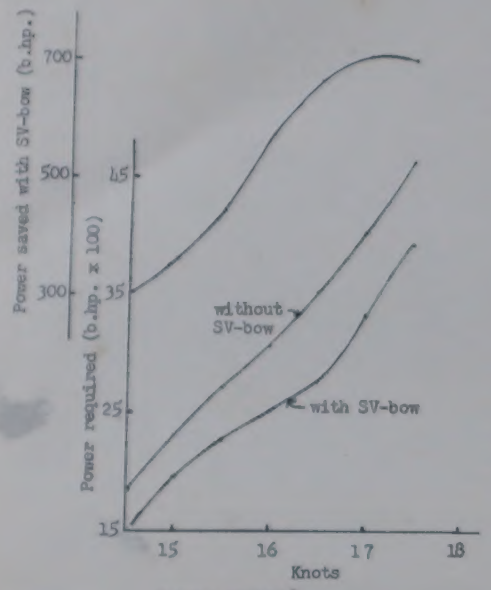
 [4 figures] (over)

2.1474 A BUOYLINE COILING DEVICE

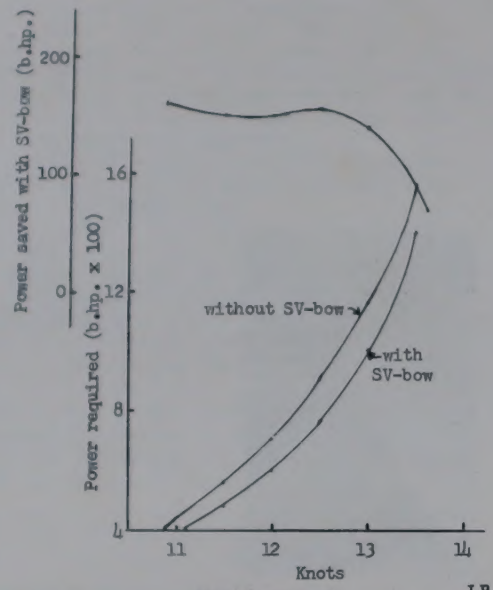
Ellis, Ian, and Gary Loverich (Exploratory Fishing and Gear Research Base, National Marine Fisheries Service, NOAA, 2725 Montlake Blvd. East, Seattle, Wash. 98102)
Commercial Fisheries Review 33, No. 2, 42-45 (February 1971)

This article describes a buoyline coiling device. It was successfully employed in pot fishing for black cod in waters off the coast of the State of Washington. The device is incorporated as a modification to a standard crab pot hauler (crab block). The amount of time required to haul a sablefish pot with the use of the buoyline coiling device is less than one-half that required by conventional means. [5 figures] FTP

2.115



Large vessel



Small vessel LB

2.3 SHUCKING OF BIVALVES

Snow, Harold F. (Scarboro, Maine; assignor to Borden, Inc.) (pat.)
U.S. Patent 3,564,648 (February 23, 1971)

Heat applied to the shells is the most satisfactory method of nonmechanically releasing mollusk meats. Most devices for applying the heat have the burners located either beside or above the mollusk so that the orifices of the burners can be kept free of the drippings mollusks release upon being heated. As a result, the air drawn from below passes between the flame and the shell, tending to insulate the shell and either prevent or materially reduce the breakdown of the bonds holding the meat to the shell. Moreover, side-mounted devices require that the mollusks be manually oriented to insure that their mouths are vertically positioned. In the device described here, the gas burners are located directly beneath the open-meshed wire conveyor belt that bears the mollusks through the shucking device. The burners are so designed that falling juices, sand, and shell debris in no way foul the orifices, even during long runs. A roof of heat-resistant material above the conveyor reflects heat to the upper surface of the shell; it is raised sufficiently high above the conveyor bed to permit ample flue volume for the flow of combustion gases. [4 figures] LB

2.3 SKINNING OF FISH FILLETS

Nordischer Maschinenbau Rud. Baader (German Federal Republic) (pat.)
British Patent 1,219,693
BFMIRA Abstracts 24, No. 3, Abstract No. 924, 197 (March 1971)

The equipment described is claimed to be capable of handling small plaice as well as larger fillets without loss of flesh. Reprinted

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2.1121 (2.1123)(2.114)

snood are dragged from a slotted magazine, which prevents the hooks from tangling, through a hopper full of chopped bait; the hook snags a piece of bait, which covers the point and prevents more bait from being hooked; a chute just beyond the hopper collects any surplus bait that may be carried through on the line; a brake just beyond the chute checks line runout. The design has been patented.
[8 figures] LB

2.1121 MESH SELECTION STUDIES ON FLATFISH IN RELATION TO (9.17) THE OTAGO TRAWL FISHERY

James, G. D. (Fisheries Research Division, Marine Department, Wellington, New Zealand)
New Zealand Journal of Marine and Freshwater Research 4, No. 3, 229-240 (September 1970)

If a trawl fishery is to be sustained, the nets must release enough small fish to ensure that recruitment into adult breeding stocks remains at a satisfactory level. Hence the relation between the size of the mesh and the number and size of fish that escape is important. The author investigated this relation for the three most abundant species of flatfish living off the east coast of South Island, New Zealand--English sole (Peltorhamphus novaezeelandiae Guenther), lemon sole (Pelotretis flavilatus Waite), and sand flounder (Rhombosolea plebeia, Richardson). He found that better yields would be more likely if the presently stipulated minimum for the cod-end mesh size were increased from 4 to 4.5 in.
[5 figures, 3 tables, 16 references] LB

2.1475 WORKING TIME OF DANISH SEINERS DURING ALASKA POLLACK FISHERY--
VI. THE RELATION OF WORKING TIME TO WIND WAVE
AFTER ELIMINATION OF THE INFLUENCE OF DIFFERENT AMOUNT OF CATCH

Maéda, Hiroshi, and Shiro Minami (Shimonoseki University of Fisheries, Shimonoseki, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 36, No. 11, 1115-1121 (November 1970)

In the preceding report, the authors noted that the times spent in laying the net, in the net's sinking, and in pulling in the net were unrelated to catch. They were, however, somewhat increased by the wind wave (the height of the wave relative to its width). The hauling-brailing operation, which takes the greatest amount of time during net unloading) was particularly influenced by the wind wave, as it was by the size of the catch. In the present report, the authors investigate the influence of various grades of wind wave on the time spent in completing a haul and the time interval between hauls.

The wind wave affected hauling-brailing time far less than the catch did; it changed the time-catch relation only slightly. Wind waves between grade 1 and grade 5 made little difference in the hauling-brailing time, but those in excess of grade 6 increased this time significantly, possibly because the assistance the rolling of the boat gives in raising the net is counteracted by the difficulties the increased roll presents to the fishermen themselves. Wind waves of grade 2 increased hauling-brailing time most noticeably, and those of grade 3 next most, although neither grade exerted enough influence to negate the general trend of effects mentioned above.
[4 figures, 2 tables, 3 references] LB

2.9 (1.89) TOXICITY OF A TURBAN-SHELL IN THE PACIFIC

Hashimoto, Yoshiro, Shoji Konosu, Masaki Shibuta, and Katsuko Watanabe (Laboratory of Marine Biochemistry, Faculty of Agriculture, The University of Tokyo, Tokyo, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 36, No. 11, 1163-1171 (November 1970)

Incidents of a ciguateralike poisoning were investigated. The causative species, a silver-mouthed turban shell (Turbo (Marmarostoma) argyrostoma), was found to contain both water- and fat-soluble toxins in the midgut gland and in the gut contents; the muscle was nontoxic.

The water-soluble toxin resembles aluterin (a toxin found in the gut contents of filefish, Alutera scripta) in that it is extractable with n-butanol, is nondialyzable in cellulose tubing, and is precipitable with acetone. However, unlike aluterin, it has a hemolytic activity. The toxicity of partially purified preparations from the gut contents and the midgut gland was 40 and 65 μg./g., respectively.

The fat-soluble toxin resembles ciguatoxin. However, it can be eluted from a silicic-acid column with chloroform and methanol (1:1), whereas ciguatoxin is recoverable with a less polar solvent. (Toxicity of this fraction was 20 μg./g.; no further purification was successful.) In addition, ciguatoxin causes diarrhea and excessive salivation in test animals--the snail toxin does not; and the snail toxin caused inflammation of the eyelids--ciguatoxin does not. In human patients,

(over)

3.12 (4.60) GLUCOSE OXIDASE REDUCES OXIDATION IN FROZEN SHRIMP

Kelley, Carolyn (National Marine Fisheries Service, Technological Laboratory, Ketchikan, Alaska 99901)
Commercial Fisheries Review 33, No. 2, 51-52 (February 1971)

Use of glucose oxidase-catalase preparations was effective in decreasing oxidation and loss of color in frozen Alaska shrimp.
[4 references] FTP

2.9 (7.9) ASSAY AND CONTROL OF MARINE BIOTOXINS

McFarren, Earl F. (Bureau of Water Hygiene, Department of HEW, Public Health Service, Environmental Control Administration, Cincinnati Laboratories, Cincinnati, Ohio 45213)
Food Technology 25, No. 3, 38, 40-42, 44, 46, 48 (March 1971)

Three well-defined types of poisoning may result from eating certain fresh, unspoiled marine organisms: (1) Paralytic shellfish poisoning. The poison may occur in mussels, clams, oysters, starfish, and sand crabs. The poison is produced by the dinoflagellate Gonyaulax catanella and passes up the food chain to the marine organism. (2) Puffer poisoning. The poison is endogeneous to certain species of fish of the family Tetraodontidae and to amphibians of the family Salamandridae. (3) Ciguatera poisoning. The poison occurs in certain fish and shellfish that inhabit the reefs, such as reef sharks, moray eels, barracuda, groupers, snappers, and mollusks.

Two types of poisonings, not so well-defined as the three previsouly mentioned, are: (1) Clupeoid poisoning. The poison is occasionally found in herring and sardines. (2) Hallucinatory mullet poisoning. The poison may occur in certain locations and seasonally in mullet, surmullet, and goatfish.

No specific chemical methods are available to determine any of the poisons. Several biological methods are used to assay certain of the poisons and they are reasonably specific for the poisons when properly performed.

In the United States, the poisoning from shellfish is controlled by the regular collection and assaying of samples of shellfish from commercial growing areas coupled with a management scheme.

(over)

3.15 MICROWAVE ENERGY IN FOOD PROCESSING APPLICATIONS

Decareau, Robert V. (Microwave Energy Applications Newsletter, Amherst, N.H.)
CRC Critical Reviews in Food Technology 1, No. 2, 199-224 (May 1970)

Microwave finish-drying, freeze-drying, and sterilizing are discussed, as are the selection of a proper frequency for and the economics of microwave processing. Significant progress has been made in this type of processing despite the lack of agreement among workers in the field on such matters as the nature of microwave action on food and the quality of the existing dielectric data that are needed to arrive at meaningful decisions. [11 figures, 6 tables, 44 references] LB

3.15 (3.2382)(6.54) STERILIZATION OF MATERIALS

Constable, R. J. W., and J. R. Blake; Hirst (Microwave Heating) Ltd. and Richards Engineers Ltd. (pat.)
British Patent 1, 222,208
BFMIRA Abstracts 24, No. 4, Abstract No. 1211, 260 (April 1971)

A method for sterilizing food materials such as meat pastes, etc. which are to be packed in plastic films is described. It involves forcing the material into a vessel so that it becomes pressurized, and heating the food with microwaves while the pressure is maintained. The sterile material is then aseptically packaged. Reprinted

3.12 (6.37) COATING PROCESS

Japanese Patent 27780/70
Meiji Seika Kaisha (pat.)
Food Technology 25, No. 3, 82 (March 1971)

Foodstuffs are dipped into a solution of alginic acid containing gelatin, then the coated foodstuff is contacted with a solution of a calcium salt to make the coating insolube. Finally, the product is heated in the presence of an organic acid or the salt of an organic acid. FTP

3.12 GELLED FOOD PRODUCTION
(6.37)

Japanese Patent 29422/70
Takanashi, K. (pat.)
Food Technology 25, No. 3, 82 (March 1971)

Gelled food products are prepared by use of alginate, carrageenan, and lower methoxyl pectin, singly or in combination.
FTP

2.9 FOOD POISONING FROM CONSUMPTION OF SALT WATER FISH
(0.4)

Pattin, S., Ch. Laverdant (Med. Hôp. Armées, Hôp. Maritime, Brest, France)
Chemical Abstracts 74, No. 9, 40694p (March 1, 1971)

2.9 TOXINS FROM FISH AND OTHER MARINE ORGANISMS

Scheuer, Paul J. (Dep. Chem., Univ. Hawaii, Hawaii)
Chemical Abstracts 74, No. 1, 2304d (January 4, 1971)

3.12 FISH PRESERVATION

British Patent 1,204,559
Gelgy, A. G. (pat.)
Food Technology 25, No. 3, 49 (March 1971)

Fish to be preserved in ice are first treated with mixtures of EDTA and a diphenylether (such as 2-hydroxy-3',4,4'-trichlorodiphenylether). FTP

3.12 FORMATION OF NITROSAMINES IN NITRITE-TREATED FISH

Sen, N. P. et al.
Can. Inst. Fd Technol. J. 3, No. 2, 66-69 (1970)
BFMIRA Abstracts 24, No. 3, Abstract No. 721, 154 (March 1971)

Samples of smoked fish-cod herring, halibut, haddock, mackerel, hake and salmon and samples of canned mackerel and salmon were each cooked with 200 p.p.m. sodium nitrite and analysed for nitrosamines. The results indicated that certain kinds of fish especially those rich in amines can form dimethylnitrosamine (DMN) during cooking with nitrite. The identity of the DMN was verified in each case by thin-layer and gas chromatography. S.M.S.
Reprinted

3.2385 FLEXIBLE PACKAGING OF FOODS

Brody, Aaron L. (Arthur D. Little, Inc., Food and Flavor Section, Cambridge, Mass.)
CRC Critical Reviews in Food Technology 1, No. 1, 71-155 (February 1970)

The rationale for packaging foods in flexible materials, the packaging requirements of 15 categories of food (including meat; canned, convenience, and frozen foods; and snacks), the types of packaging, and the equipment used are reviewed.
[3 figures, 2 tables, 109 references]
LB

2.9 METHIONINE, VITAMIN E, AND SELENIUM TOXICITY
(0.32)(5.7)(0.7)

Anonymous
Nutrition Reviews 29, No. 2, 48-50 (February 1971)

The toxicity of a substance is relative, and in the case of nutrients should be considered in terms of physiological level versus the toxic level. Methionine and several other compounds protect against the symptoms of moderately high levels of selenium in the diet, but only in the presence of adequate levels of vitamin E or certain fat soluble antioxidants. It is suggested that methionine is necessary along with vitamin E or certain antioxidants for methylation of selenium metabolites, which in turn are readily excreted, thus detoxifying selenium.

Studies on the metabolic fate of physiological levels of selenium should be extended to include its relations with cadmium, because it is known that selenium protects against cadmium toxicity. The high levels of cadmium being introduced into the environment would make such studies not only practical but urgent.
[5 literature citations]
Extracted

2.9 (7.9)

Apparently fatalities due to puffer poisoning are insignificant. Because the puffer poison is endogeneous in origin, and some species of marine animals are nearly always toxic while others are not, the simplest method to control puffer poisoning is to educate the fishermen in identifying those species that may be toxic. Ingested poison is passed along through the food chain of marine organisms. And, because fish do not remain in one location, the only way to control ciguatera poisoning, apparently, is through testing each fish before it is eaten.
[3 tables, 57 references]
FTP

2.9 (1.89)

Symptoms of the snail toxin differ from those of ciguatoxin in the delayed appearance of the first symptom, the patients' development of serious itching, and their lack of aching joints.

The gut contents of a surgeonfish (Ctenochaetus striatus) exhibit a similar pattern of toxicity to that found in the turban shell; they also contain a toxin quite similar to the water-soluble toxin found here. Since both the surgeonfish and the turban shell graze on benthic algae, the authors hypothesize that an ecological pathway leading to toxic algae on coral reefs may be indicated. These algae, according to Randall (1958), may be the primary source of the toxins in ciguatoxic fishes.
[3 figures, 3 tables, 10 references]
LB

3.2499 (8.8) PRODUCTION OF DIMETHYLAMINE IN MUSCLE OF SEVERAL SPECIES OF GADOID FISH DURING FROZEN STORAGE, ESPECIALLY IN RELATION TO PRESENCE OF DARK MUSCLE

Castell, C. H., Barbara Smith, and Wanda Neal (Fisheries Research Board of Canada, Halifax,Laboratory, Halifax, Nova Scotia)
Journal of the Fisheries Research Board of Canada 28, No. 1, 1-5 (January 1971)

Earlier workers found that small amounts of dimethylamine (DMA) are produced in the muscle of some species of fish during their storage in ice. Some evidence indicates that a similar reaction occurs in some fish during frozen storage. In the present study, the authors made a systematic examination of the production of DMA in nine species of commercial fish during frozen storage. They were able to compare the rates of DMA formation in the various species of fish by having started with strictly fresh fish, and by packaging, freezing, and storing them under identical conditions. Storage temperature was -5° C.

DMA was produced in the muscles of five gadoid species of fish during frozen (-.5° C.) storage. The amount of DMA produced was lowest in haddock and was progressivly higher in cod, pollock, cusk, and hake. When the dark lateral muscle was removed from the fillets before they were frozen, the formation of DMA in the muscle was either inhibited or greatly reduced. No DMA was produced in the muscle of halibut, plaice, redfish, or wolffish during frozen storage.
[3 figures, 21 references] FTP

3.60 FOAM DRYING IN THE FOOD INDUSTRY

Hertzendorf, Martin S., and Raymond J. Moshy (Research Division, American Machine and Foundry Co., Stamford, Conn.)
CRC Critical Review in Food Technology 1, No. 1, 25-70 (February 1970)

The authors review the three basic types of foam drying--vacuum puff, foam mat, and foam spray--and relate the process parameters of each to those of other drying methods and to generalized drying theory. They also describe each in terms of equipment required, type of food products most congenial to the method, characteristics of the product, and economics of the method.
[16 figures, 15 tables, 113 references] LB

3.63 DRIED CUTTLEFISH

Japanese Patent 31345/70
Hashimoto, S. (pat.)
Food Technology 25, No. 3, 49 (March 1971)

The dried cuttlefish is fried in oil. FTP

3.335 FISH PROTEINS AS BINDERS IN PROCESSED FISHERY PRODUCTS

Learson, R. J., B. L. Tinker, and L. J. Ronsivalli (Fishery Products Technology Laboratory, National Marine Fisheries Service, Emerson Ave., Gloucester, Mass. 01930)
Commercial Fisheries Review 33, No. 2, 46-50 (February 1971)

This technical note briefly discusses several experiments on the use of fish proteins as binding agents in new fish products. The binding agents were prepared by comminuting fish muscle in a silent cutter. The binder was successfully tested in new products prepared from crab and shrimp.
[3 figures, 8 references] FTP

3.335 SPECIAL PROBLEMS ENCOUNTERED IN SEASONING DELICATESSEN, READY-TO-EAT MEALS AND CANNED BABY FOODS

Schelde, J.
Fd Trade Rev. 41, No. 1, 23-24 (1971)
BEMIRA Abstracts 24, No. 4, Abstract No. 1097, 238 (April 1971)

The author discusses the use of seasonings in meat products, delicatessen and ready-to-eat products, pickle products, fish products, and baby foods. D.B.
Reprinted

4.15 (1.79) STUDIES ON LIVER OIL OF A FRILL SHARK

Shimma, Hisako (Tokai Reg. Fish. Res. Lab. Kachidoki, Chuo-ku, Tokyo, Japan), and Yaichiro Shimma (Freshwater Fish. Res. Lab. Miya, Hino-shi, Tokyo)
Bulletin of the Japanese Society of Scientific Fisheries 36, No. 11, 1157-1162 (November 1970) (In Japanese; figures, tables, and summary in English)

Using Florisil column chromatography, the authors separated the unsaponifiable constituents of liver oil of a frill shark (Chlamydoselachus anguineus) into hydrocarbon, fatty alcohol, cholesterol, and glyceryl ether fractions. Cholesterol constituted 17% of the unsaponifiable matter, or 82 mg./g. of the liver oil. Although the glyceryl ether fraction constituted 2.4% of the eluted matter, it actually made up only about 0.7% of the total volume, since the yield of acetonates was only 30.8% and many impurities were present.

Using gas-liquid chromatography, the authors analyzed the alcohols and the long-chain alcohol groups of the glyceryl ethers. The main constituents of the alcohols from the wax esters were 18:1 (75.6%), 20:1 (9.9%), and 16:0 (5.7%); those of the alcohol groups of the glyceryl ethers were 18:1 (68.0%), 16:1 (15.9%), and 16:0 (14.0%). Two fatty acid fractions were separated from the wax ester and triglyceride fractions; the composition patterns of the fatty acids showed little difference in the 22:1 and 22:6 fatty acid content.

On the basis of what is known about the composition of wax and of fatty acids of other fishes, the authors conclude that the glyceryl ethers in shark liver oil are probably evolutionay intermediates between wax esters and triglycerides.
[3 figures, 5 tables, 16 references] LB

3.2344 FREEZING PROCESS

British Patent 1,205,608
Alfa-Laval Bergedorfer Eisenwerk G.m.b.H. (pat.)
Food Technology 25, No. 3, 49 (March 1971)

By this process, spaces containing water and air cavities are minimized in fish and meat to be frozen in a pressure-plate freezer. FTP

4.81 OIL IMPROVEMENT

Japanese Patent 28898/70
Anjinomoto Co. (pat.)
Food Technology 25, No. 3, 78 (March 1971)

Cystine is mixed with fats and oils and the mixture is heated. FTP

3.4 LIQUID SMOKE FLAVORING

German Patent 1,717,068
Henning, W. (pat.)
Food Technology 25, No. 3, 80 (March 1971)

Cold smoke is passed through granular sugar or salt. The resulting material is then mixed with water to separate out the insoluble constituents. The clear solution that is obtained contains no carcinogens and is capable of imparting a rich smoke flavor. FTP

3.64 COMPUTER-AIDED PREDICTIONS OF FOOD STORAGE STABILITY: OXIDATIVE DETERIORATION OF A SHRIMP PRODUCT

Simon, I. B., T. P. Labuza, and M. Karel (Department of Nutrition and Food Science, Massachusetts Institute of Technology, Cambridge, Mass. 02139)
Journal of Food Science 36, No. 2, 280-286 (March 1971)

This paper describes a method for predicting the stability of foods which deteriorate through an oxidative process, and the application of the method to evaluate the loss of carotenoid pigments in a freeze-dried shrimp product (a specially prepared freeze-dried shrimp cocktail bar). In the shrimp bar, the deterioration determined organoleptically was correlated with absorption of oxygen and with loss of carotenoid pigment; these indices of oxidation were used for the study. The rates of oxidation were examined as a function of oxygen concentration, and permeability characteristics of materials used to package the shrimp bars were determined. From the kinetic data for oxidation of the shrimp bar and from the permeability data, the authors developed a mathematical model for predicting the storage life of the product. The pertinent equations were solved and the storage life predicted by an iteration process using a high-speed digital computer. The storage life predictions gave good results when compared with the data obtained from actual storage tests; those predictions based upon pigment loss were better than those based upon changes in flavor score.
[10 figures, 4 tables, 18 references] FTP

6.1 (9.6) FISH MEAL
A COMPREHENSIVE BIBLIOGRAPHY

Anonymous
Compiled by the National Center for Fish Protein Concentrate, National Marine Fisheries Service, NOAA, U.S. Department of Commerce, Washington, D.C., v + 343 pp. (1970)

This bibliography was compiled by the Animal Nutrition Section of the National Center for Fish Protein Concentrate, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce. It was prepared to provide a comprehensive reference to research efforts studying the use of fishmeal and its protein byproducts for animal consumption. This publication is provided as a service by the National Center for Fish Protein Concentrate for those desiring extensive information on fishmeal. The contents have been organized into six major categories: general aspects, history and development, processing methods, storage and preservation, analytical data, and nutritive value.

This review contains literature published from 1940 through 1969. Most of the material is from Chemical Abstracts, Biological Abstracts, Commercial Fisheries Abstracts, Food Science Abstracts, and Nutrition Abstracts and Reviews. The abstracts were taken as they appeared in the abstract journals. Citations to published articles were edited to conform to a consistent style.

Reprinted in part

6.190 FISH MEALS IN RATIONS OF WHITE LEGHORN LAYING AND BREEDING CHICKENS

Bearse, Gordon E. (Department of Animal Sciences, Washington State University, Western Washington Research and Extension Service, Puyallup, Wash.)
Feedstuffs 43, No. 13, 30-31 (March 27, 1971)
Card A

Until recent years, Pacific Northwest poultry feeders have used fish meals from Alaska and British Columbia as an economical source of high-quality protein. But with the decline of the North Pacific herring fishery, they have turned increasingly to other parts of the world for fish protein--proteins that vary in quality, content, and price. To evaluate the effectiveness of various protein meals, the author conducted three experiments on White Leghorn hens.

In experiment 1, three lots of 55 pullets, 20 weeks old, were fed for 40 wk. on rations containing one of the following: either 5 or 10% B.C. herring meal or 5 or 10% Pacific hake meal. Protein (with soybean meal as a supplement), calcium, phosphorus, and metabolizable energy (M.E.) levels were 17%, 3.0%, 0.70%, and 1,283 Cal./lb., respectively, in all the diets. On the basis of egg production, the 10% herring meal gave slightly better results, but on the basis of feed efficiency, both herring meals were slightly less efficient. The hen's body weight was not significantly different as a result of eating any of the four rations; nor was their incidence of mortality, here and in the other two experiments. On the basis of the eggs' hatchability, albumen quality, and yolk color, differences in the rations were insignificant, as they were on the basis of embryo mortality and the percent of day-old culls. But hens fed either of the herring meals gave eggs significantly higher in specific gravity, and those fed 10% hake meal rations gave eggs of significantly less weight, noticeable at various points in the experiment.

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6.190 FISH MEALS IN RATIONS OF WHITE LEGHORN LAYING AND BREEDING CHICKENS

Bearse, Gordon E.
Feedstuffs 43, No. 13, 30-31 (March 27, 1971)

Card B

The author concludes (1) (since the hatchability of eggs from hens fed different fish meals may vary greatly, even though other performance characteristics are unaffected) that the use of more than 5% fish meal in breeding rations is not indicated; and (2) that up to 10% of several fish meals may be included in laying rations with approximately equal results. He also calls attention to a report he and others made in 1969 on the detectable differences in the flavor of eggs laid by hens fed soybean or fish meal--or even hake or herring meal.
[2 tables, 14 references] LB

6.31 FREE AMINO ACID COMPOSITION OF ACCELERATEDLY CULTURED MAKOMBU, LAMINARIA JAPONICA, AT DIFFERENT GROWING STAGES

Oishi, Keiichi (Laboratory of Seafood Chemistry, Faculty of Fisheries, Hokkaido University, Hakodate, Japan), and Naomichi Kunisaki (Laboratory of Food Chemistry, Women's College of Nutrition, 3-24-3 Komagome, Tokyo)
Bulletin of the Japanese Society of Scientific Fisheries 36, No. 11, 1181-1185 (November 1970) (In Japanese; figures, tables, and summary in English)

Naturally grown makombu, one of the edible seaweeds of Japan, reaches commercial size when it is about 2 years old. With an accelerated growing method, Hasegawa has successfully reduced this growing time by half. In the 1-year-old plant, the content of free proline is higher than in the 2-year-old plant; however, glutamic and aspartic acids are more dominant than the other amino acids in the extractives of the 2-year-olds, and their organoleptic quality is superior. This report describes the change in the free amino-acid composition of plants grown by the accelerated method.

Glutamic acid, which was low in April and May, increased appreciably in June and July. Proline was richer in the base and central part of the blade during the early growing stages than it was in the apex; it was richest during May and June. Alanine content increased steadily through June and then declined. The authors conclude that the free amino-acid composition of cultivated plants is similar in April and May to that of naturally grown 1-year-olds and in June and July to that of naturally grown 2-year-olds.
[5 figures, 2 tables, 4 references] LB

6.190

In experiment 2, two lots of 55 pullets, 20 weeks old, were fed for 52 wk. on rations containing one of the following: 5% B.C. herring meal, Pacific hake meal, Norwegian herring meal, or Peruvian anchovy meal; 10% anchovy meal; or 20% soybean meal. Protein (with soybean meal as a supplement), calcium, phosphorus, and M.E. levels were 16.5%, 3.0%, 0.70%, and 1,364 Cal./lb., respectively, in all the diets. On the basis of egg production and feed efficiency, the soybean and 10% anchovy meals were least efficient, the anchovy meal being lowest of all. The body weight of hens fed Norwegian herring meal was slightly higher than the other hens' yet their eggs averaged 1 g. more. The specific gravity of eggs from hens fed B.C. herring meals was significantly higher than that of other eggs (soybean and 5% hake meals made for shells much the thinnest); 10% anchovy meal made for slightly higher albumen quality; and 5% B.C. herring meal made for significantly better hatchability than did hake, 10% anchovy, or soybean meals. Yolk color, blood spots, embryo mortality, and percent of day-old culls were not significantly affected by the rations.

In experiment 3, four lots of 35 hens, 43 weeks old, were fed for 16 weeks on rations containing either 5 or 10% Newfoundland herring meal or 20% soybean meal. Protein, calcium, and phosphorus levels were 15.75, 3.0, and 0.70%, respectively. The hens' egg production, feed efficiency, and mortality were not significantly affected by the composition of the ration; nor was the specific gravity of the eggs they laid. However, the hatchability of the eggs was somewhat reduced when the ration contained 5% Newfoundland herring meal; it was drastically reduced when the ration contained 10% of this meal. Soybean meal gave the best hatchability results. The 10% Newfoundland herring meal also caused a significantly higher percent of day-old culls and significantly slower growth and poorer feathering of chicks. LB

(Continued on Card B)

6.34 SYNOPSIS OF BIOLOGICAL DATA ON KNOBBED WRACK ASCOPHYLLUM NODOSUM (LINNAEUS) LE JOLIS

Baardseth, E. (University of Bergen, Biological Station Espegrend, Blomsterdalen, Norway)
FAO Fisheries Synopsis No. 38, Rev. 1, vi + 54 pp. (December 1970) (Rome, Italy)

The considerable importance of knobbed wrack as a source of raw material for alginates prompted preparation of this synopsis. The provisional version (issued in August 1968) was presented at the VI International Seaweed Symposium, held in Santiago de Compostela September 9-13, 1968. The information contained comes not only from the literature but also from unpublished results of investigations made on this seaweed by scientists round the world.
[9 figures, 9 tables, 124 references] LB

6.37 CHORELLA [CHLORELLA] PRODUCT

Japanese Patent 24813/70
Korejima, H. (pat.)
Food Technology 25, No. 3, 82 (March 1971)

Organic chorella culture liquor (instead of water) is used in the preparation of foodstuffs. FTP

6.132 MINI-SIZE FISH MEAL PLANT
(2.114)

Anonymous
Commercial Fishing 10, No. 1, 11 (January 1971)

A small, compact fishmeal plant suitable for trawler installation is claimed to produce the same high-quality meal and oil that larger plants produce. Since the raw material is minced before being cooked, the small particles are heated uniformly and all the protein is coagulated; and since a decanter centrifuge is used to separate the cooked fish mass, about 2% more meal is produced than in conventional plants--the sludge from the decanter has a higher moisture content than does cake from a normal screw-press, so a greater proportion of the protein goes into the drier. All the heat required for the cooker and the drier comes from a furnace; the only fresh water required (about 4 gal. per hour) is that for operating the discharge system of the solids-ejecting separator. The plant can process a half ton of raw material an hour. Since all controls are centralized on a console, one man can operate the plant. The absence of a steam boiler makes for safety and lower maintenance. LB

6.132 DECALCIFICATION OF CRUSTACEAN MEALS

Rutledge, James E. (Department of Food Science, Louisiana State University, Baton Rouge, La. 70803)
Journal of Agricultural and Food Chemistry 19, No. 2, 236-237 (March-April 1971)

The purpose of this study was to reduce the level of calcium in crustacean (blue crab and fresh-water crayfish) meals. The exoskeleton (shell) of the crustacea contains a high proportion of $CaCO_3$. Lowering of the amount of calcium in the crustacean meals was accomplished by the physical separation of some of the shell from the meal.

The crustacean waste material was dried to a moisture level of 6% or lower. The dried material was ground in a mill with a ¼-inch screen. The ground meal was then sieved through a No. 12 U.S. standard mesh sieve. Some of the shell was removed from meal in the sieving process; apparently, the protein constituents of the meal were reduced to finer particles in the mill than were the shell constituents. As a result the protein content of the resulting meal was almost doubled and the calcium content was reduced by as much as 68%.
[2 tables] FTP

6.135 FAT DEODORIZATION

Japanese Patent 30699/70
Colgate Palmolive (pat.)
Food Technology 25, No. 3, 78 (March 1971)

The fats and oils are treated with mixtures of strong acids, bentonite, and a deodorizing material (such as sugar and starch). FTP

6.133 HARD, BRITTLE FATS FOR USE AS COCOA BUTTER SUBSTITUTES
(4.81)

Braemer-Madsen, John, Jorgen T. Erbroe, and Bent Andersen (Aarhus Oliefabrik A/S)(pat.)
British Patent 1,208,629 (Oct. 14, 1970)
Chemical Abstracts 74, No. 7, 30887q (February 15, 1971)

6.54 (0.7) EFFECT OF HISTIDINE AND METHIONINE SUPPLEMENTATION ON THE NUTRITIONAL QUALITY OF COMMERCIALLY PREPARED FISH PROTEIN CONCENTRATE IN RAT DIETS

Makdani, D. D., J. T. Huber, and W. G. Bergen (Department of Dairy and Animal Husbandry, Michigan State University, East Lansing, Mich. 48823)
Journal of Nutrition 101, No. 3, 367-375 (March 1971)

The purpose of this study was (1) to evaluate the nutritional quality of commercially prepared fish protein concentrates (FPC), (2) to determine the effect of supplementing FPC with histidine and methionine on the growth of rats, and (3) to determine why isopropanol-extracted FPC is nutritionally superior to dichloroethane-extracted FPC.

Four FPC products were examined:

1. DCE-RH-FPC. Prepared by extracting whole red hake with 1,2-dichloroethane.
2. DCE-EA-FPC. Prepared by refluxing DCE-RH-FPC in ethanol at 65° C. for 1 hr., then removing the ethanol.
3. IPA-RH-FPC. Prepared by extracting red hake with isopropanol.
4. IPA-AH-FPC. Prepared by extracting pressed cake of Atlantic herring with isopropanol. (Only a limited amount of IPA-RH-FPC was available for the experiments; therefore, it was not used in the supplementation trials.) The feeding tests were carried out with 21-day-old weanling male rats. A basal casein diet was used as the control.

Diets containing IPA-AH-FPC were superior to those containing casein, IPA-RH-FPC, DCF-RH-FPC, and DCE-EA-FPC. The IPA-AH-FPC had a higher content of essential amino acids than did the other three FPCs. When diets containing IPA-AH-FPC, DCE-RH-FPC, and DCE-EA-FPC were supplemented with L-histidine (0.075%), the rats

 (over)

6.55 OYSTER-SHELL FLAKES

Anonymous
Feedstuffs 43, No. 11, 18 (March 13, 1971)

This article reviews the findings reported by M. L. Scott and P. A. Mullenhoff (Department of Poultry Science, Cornell University, Ithaca, N.Y.) in Food and Life Science Quarterly (January-March), published by New York State Agricultural Experiment Station, Geneva, and Cornell University Agricultural Experiment Station, Ithaca, N.Y.

The recommended diet for laying hens includes 3.5% calcium, of which pulverized limestone has, up to now, provided between 2 and 2.5%. Now, however, Scott and Mullenhoff recommend that 2/3 the limestone be replaced by dime-sized oystershell flakes. They theorized that large particles of oyster shell accumulated in the gizzard during daytime feeding would slowly dissolve throughout the night and maintain a high level of calcium in the hen's blood. Thus the egg, which remains in the shell gland for about 20 hours, would have improved shell thickness and breaking strength.

Tests proved the validity of their theory. In every instance, eggs from hens fed the oyster shells had markedly superior shell quality to eggs from controls fed limestone without the shell substitute. After 9 months of production (eggshell quality usually decreases as hens grow older during the 12-month egg-producing period), oystershell-fed hens gave eggs having an average breaking strength of up to 6.35 lb., whereas control hens gave eggs having an average breaking strength of 5 lb. Many of these latter eggs cannot withstand, unbroken, the stresses of the processing line. In addition to increased eggshell strength, the tests showed that

(over)

6.55 SUMMARY AND EVALUATION OF SELECTED PAPERS PRESENTED AT THE ANNUAL MEETING OF THE POULTRY SECTION, ASSOCIATION OF SOUTHERN WORKERS

Couch, J. R. (Department of Poultry Science, Texas A & M University, College Station, Tex.)
Feedstuffs 43, No. 13, 9, 43-46 (March 27, 1971)

Of the 47 papers presented at the 1971 meeting of the Poultry Section, Association of Southern Agricultural Workers, about 30 are reviewed in this summary. Four deal with the use of fish products in poultry rations and three with the effects of pesticides (DDT and dieldrin) on poultry.

Broiler diet supplementation. Two duplicate experiments were conducted at the University of Florida to determine the effect of partially delactosed whey, biotin, and fish meal on broiler performance. From 1 day to 8 weeks of age, chicks were fed each of 18 diets, and feed efficiency values were calculated when the chicks were either 4 or 8 weeks old. All diets were isocaloric and isonitrogenous; the sulfur amino acids were balanced in all diets. Differences in feed efficiency values were never statistically significant; the effects of whey, biotin, and a biotin X whey interaction were significant at 4 weeks, but none of the diets significantly influenced growth at 8 weeks. The reviewer concludes from these data that practical broiler diets need not be supplemented with biotin, and he notes that the chicks did not respond to possible unidentified growth factors that have been thought to exist in delactosed whey and fish meal.

Calcium sources and antibiotics. Two calcium sources (calcium carbonate in the form of finely ground limestone and oyster shell) and three antibiotics (chlortetracycline, oxytetracycline, and neomycin-oxytetracycline) were studied at the University of Georgia for their effect on breaking strength, specific gravity, and

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7.42 SYRINGE PROCEDURE FOR TRANSFER OF NANOGRAM QUANTITIES OF MERCURY VAPOR FOR FLAMELESS ATOMIC ABSORPTION SPECTROPHOTOMETRY

Stainton, Michael P. (Fisheries Research Board of Canada, Freshwater Institute, 501 University Crescent, Winnipeg 19, Manitoba, Canada)
Analytical Chemistry 43, No. 4, 625-627 (April 1971)

This article describes a method, using a syringe, for transferring nanogram quantities of mercury vapor (in equilibrium with reducing solution) for the cuvette in the determination of mercury by flameless atomic absorption spectrophotometry. The procedure involves the use of a small-volume (3 cc.) cuvette, thus a small sample can be used. The method was tested by analyzing the mercury content of northern pike. The method offers excellent precision with a relative standard deviation of 1% at the 20 µg. of mercury per liter level. About 40 to 60 samples per hour can be run.

[5 figures, 2 tables]

FTP

7.51 EVALUATION OF PROTEIN QUALITY BASED ON RESIDUAL AMINO ACIDS OF THE ILEAL CONTENTS OF CHICKS

Soares, J. H., Jr., and R. R. Kifer (National Center for Fish Protein Concentrate, National Marine Fisheries Service, NOAA, U.S. Department of Commerce, College Park, Md. 20740)
Poultry Science 50, No. 1, 41-46 (January 1971)

In this study, the authors tried to evaluate the quality of the protein from various sources (casein, soybean meal, cottonseed meal, herring fish meal, anchovy fish meal) based on the recovery of amino acids in the contents of the ilia of chicks. Three different quality (protein) grades (good, fair, and poor) of each type of fish meal were used in the experiment.

The protein from casein had an average amino-acid digestibility of 93.1%; that from soybean meal, 79.3%; and that from cottonseed meal, 65.0%. The average amino-acid digestibilities of the six fish meals (a good, a fair, and a poor quality anchovy meal; a good, a fair, and a poor quality herring meal) ranged from 84.0 to 73.5%. The values for the digestibilities of the amino acids in the proteins of the fish meals could not be correlated with the values obtained for protein quality (as determined by the chick growth method).
[6 tables, 13 references] FTP

7.43 REMOVAL OF TRACE METALS FROM MARINE CULTURE MEDIA

Davey, Earl W., John H. Gentile, Stanton J. Erickson, and Peter Betzer (Nat. Mar. Water Qual. Lab., Fed. Water Pollut. Contr. Admin., West Kingston, R.I.)
Chemical Abstracts 73, No. 23, 117098m (December 7, 1970)

6.55

hens fed the oystershell diet had higher blood-calcium levels than did the controls --at 1 a.m., their blood-calcium level was 17% higher, and at 4 p.m., it was 8.9% higher. This slow release of calcium was corroborated by analyses of the contents of the gizzard. LB

6.59 STUDIES ON BLANCHED WATER - A WASTE PRODUCT OF THE SHRIMP CANNING INDUSTRY

Hag, S. A., I. H. Siddiqui, and A. H. Khan
Pakist. J. scient. ind. Res. 12, 49-51 (1969)
BFMIRA Abstracts 24, No. 1, Abstract No. 220, 46 (January 1971)

"In shrimp canning factories, the waste waters from the blanching process contain 16 per cent protein and about 78 per cent sodium chloride. Experiments showed that dialysis under static conditions, recovered 80 per cent of the salt and concentrated the protein to 60 per cent; dialysis under flow-through conditions was not effective." Reprinted

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6.54 (0.7)

showed increased feed intakes and increased growth. When diets containing IPA-AH-FPC, DCE-RH-FPC, or DCE-EA-FPC were supplemented with L-histidine (0.075%) or methionine (0.20%), the rats showed increased growth; added histidine and methionine had an additive effect on growth.

The authors concluded that differences in nutritional quality between the FPCs are overcome by supplementing the FPCs with histidine or methionine or both. Histidine and methionine were limiting in IPA-AH-FPC, DCE-RH-FPC, and DCE-EA-FPC.
[6 tables, 19 references] FTP

6.54 SAUCE MANUFACTURE

Beans-Arcega, L.
Process Biochem. 5, No. 10, 50-51, 56 (1970)
BFMIRA Abstracts 24, No. 2, Abstract No. 463, 100 (February 1971)

The manufacture of soy sauce and sauces from fish is described. Reprinted

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6.55

mineral content of egg shells. The addition of oyster shell to the diets significantly increased the specific gravity and breaking strength of the shells (these two characteristics were highly correlated; specific gravity and calcium content were apparently unrelated). Up to 24° C., the addition also increased the deposition of zinc in the shell; calcium content increased when temperatures were above 24° C. The addition of antibiotics to the diets produced no consistent increase in the breaking strength of the shells.

Turkey nutrition. Two papers from Virginia Polytechnic Institute State University were concerned with the effects on the body weight of turkeys of diets supplemented with erythromycin (E), liquid streptomyces solubles (LSS), corn distillers dried solubles, or fish meal. In the experiments in which fish meal was a variable, the body weight of 912, 4-week poults was increased 6.8% by addition of 4.1 mg. of E/kg. of diet; 22.5% by addition of 0.625% LSS; 23.7% by addition of the LSS plus the E; and 6.5% by addition of either 5% fish meal or 5% of a mixture of animal protein products and fish meal.

DDT. At the University of Georgia, 96 White Leghorn hens were fed a commercial laying mash containing 300, 600, or 1,200 p.p.m. DDT. Egg production of hens fed 300 or 600 p.p.m. DDT was not affected. After 6 weeks, hens fed 1,200 p.p.m. produced fewer eggs; and after 8 weeks, they developed nervous disorders and died. Although egg weight and shell beta backscatter were not altered by the diets, those containing 600 and 1,200 p.p.m. reduced shell thickness and weight by about 10%. All the DDT-containing diets doubled the incidence of shell flaws.

Dieldrin and ducks. Two studies were made by researchers at Colorado State University, working in collaboration with researchers at the University of Georgia, on the effects of feeding dieldrin to ducks. The influence of the pesticides on the vitamin A content in the liver and on the fatty acid composition of heart and liver lipids was determined. Conclusions from the findings are given. LB

7.51 AUTOMATED DETERMINATION OF PROTEIN-NITROGEN IN FOODS

Lento, H. G., and C. E. Daugherty (Campbell Institute for Food Research, Camden, N.J.)
Food Product Development 5, No. 2, 86, 88, 90, 92 (April 1971)

The standard Kjeldahl method is used by most laboratories to determine the amount of protein in foodstuffs. As early as 1959, Ferrari proposed a technique for automating the method, the basis of the technique being digestion of the sample in a rotating glass helix and determination of ammonia colorimetrically by the Berthelot reaction. However, incomplete conversion of organic nitrogen to ammonia and loss of nitrogen during the digestion steps somewhat limit the usefulness of this automated technique, for different operating conditions must frequently be used for different foods, and different digestion conditions and standards selected. The authors considered development of a singular set of parameters that could be universally applied a more practical approach to the problem. Therefore they set out to modify the continuous automatic process reported by Ferrari in 1960. This report describes the method that evolved.

To establish the general applicability of the new method, the authors analyzed some 40 different types of food by the fully automated system and, concurrently, by the manual Kjeldahl method. Statistical evaluation of the data revealed no significant differences in the results. Since these tests, the authors have conducted "many hundreds of analyses" on the same types of foods and have obtained no data to disprove their original conclusion--that their automated technique is highly reliable and generally applicable to the determination of protein-nitrogen in foods.

[5 figures, 2 tables, 13 references] LB

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7.595 DETERMINATION OF ETHOXYQUIN IN FISH MEAL BY LIQUID-LIQUID EXTRACTION AND REACTION WITH THE FREE-RADICAL α, α' DIPHENYL, β PICRYL HYDRAZYL

Contreras, Emilio
Boletin Científico No. 12, 13-39 (1970) (Library, Instituto de Fomento Pesquero, Pedro de Valdivia 2633, Casilla 1287, Santiago, Chile)

In our work we have used the same separation method [as Reid and Doesburg, who measured ethoxyquin in the acid phase by ultraviolet spectrophotometry], since we feel that the utilization of basic nitrogen of the ethoxyquin molecule is the best way of isolating the latter from complex lipids that accompany it. To the process: hydrocarbon/HCl 0.5N we have added a new separation in order to displace ethoxyquin from the acid phase to the fresh solvent, in the sequence: hydrocarbon/HCl 0.5N/hydrocarbon. In such a way most interfering substances are eliminated.

In the final extract we have preferred to use the reaction of the antioxidant with DPPH instead of its estimation at 293 mμ, which is less specific. The DPPH free radical dissolved in butanol...has a maximum absorbance at 517 mμ. The decrease in optical density at this wave length is stoichiometrically related with the antioxidant present. We have run tests in order to ascertain the magnitude of lipid interferences, efficiency of different extracting solvents in separation with HCl 0.5N, the influence of the most common additives, etc. and, finally, applying this method to more than a hundred anchovy fish meal samples at different stages of curing. Results have been most satisfactory from the standpoint of recuperation of added ethoxyquin....

[5 figures, 5 tables, 7 references] Partial reprint

7.591 (1.125)(9.3) THE ELECTROPHORETIC PATTERNS OF SKIPJACK TUNA TISSUE ESTERASES

Sprague, Lucian M. (U.S. Bureau of Commercial Fisheries, Biological Laboratory, Honolulu; present address: International Center for Marine Resource Development, University of Rhode Island, Kingston, R.I. 02881)
Hereditas 65, No. 2, 187-190 (1970)

When examined by starch-gel electrophoresis, erythrocyte-free sera of a number of tuna species exhibit one distinct zone of esterase activity. Within this zone, the author found (and reported in 1967) as many as four bands of esterase in the southern bluefin tuna (Thunnus maccoyii). In the present study, he extends his examination of tuna sera to those of the skipjack, Katsuwonus pelamis. He found as many as 12 bands of esterase activity in the zymograms of homogenized skipjack tissue. As a rule, the tissues of a single skipjack give a similar pattern, the similarity being clearly evident in the more prominent bands; each tissue, with the exception of light and dark muscles, is distinguishable one from the other, either by means of the banding pattern or of the density and rapidity of staining or both. Some of the variations are so clearly similar to those produced in known genetic systems in other forms that they can reasonably be assumed to be products of the segregation of presumably allelic genes.

The author also examined several other enzyme, substrate, and salt combinations, detecting lactate dehydrogenase, alkaline and acid phosphatase, leucine aminopeptidase, and aspartate aminotransferase in the tissue extracts. He suggests that electrophoretic methods, particularly if they are refined, offer the most useful approach known to a solution of the so-called subpopulation problem

(over)

7.599 (8.8)(3.4) GAS CHROMATOGRAPHIC DETERMINATION AND MASS SPECTROMETRIC CONFIRMATION OF N-NITROSODIMETHYLAMINE IN SMOKE-PROCESSED MARINE FISH

Fazio, Thomas, Joseph H. Damico, John W. Howard, Richard H. White, and James O. Watts (Division of Food Chemistry and Technology, Bureau of Foods and Pesticides, Food and Drug Administration, Washington, D.C. 20204)
Journal of Agricultural and Food Chemistry 19, No. 2, 250-253 (March-April 1971)

N-nitrosodimethylamine was isolated (and its identity confirmed by mass spectrometry) from samples of raw, smoked, smoke-and-nitrite-treated, and smoke-and nitrate-treated sablefish, salmon, and shad. The data are shown in the following table:

(over)

7.591 (1.125)(9.3)

and to the related problem of defining the relations between biological populations of marine animals and the physical and chemical nature of their environment. He adds that the application of available electrophoretic techniques to the study of marine invertebrates should be considered--gel electrophoresis should prove most useful in studies of invertebrate subpopulation problems that in many respects are expected to be similar to those of fishes.
[3 figures, 9 references] LB

7.593 THE VISCOSITY OF THE PIKE'S ENDOLYMPH

Ten Kate, J. H., and J. W. Kuiper (Department for Biophysics, Natuurkundig Laboratorium der Rijksuniversiteit, Groningen, The Netherlands)
Journal of Experimental Biology 53, No. 2, 495-500 (October 1970) (Cambridge University Press, 32 East 57th Street, New York, N.Y. 10022)

The authors developed a micro method, based on Stoke's law corrected for the influence of adjacent walls, for determining the absolute viscosity (η) of pike endolymph. Using the method, they found that the average η for 10 pike labyrinths is 1.20±0.08 cP at 23° C. Comparison of the values given by the proposed microviscometer method with those given by a micro-rolling-sphere viscometer showed that the η's agree within acceptable limits of error. The η values for the pike's endolymph were compared with those obtained by other authors (who are identified) for seven other vertebrate species, including plaice, haddock, cod, shark, and man. If the temperature dependence of the viscosity of water is taken into account, the values agree. Although the semicircular canals in mammals are smaller than those in pikes of equal body mass, they seem to have equal sensitivity--if the temperature effect of the endolymph viscosity is considered.
[2 figures, 3 tables, 17 references] LB

7.599 (8.8)(3.4)

Sample of fish[1]	N-nitrosodimethylamine found in fish from:	
Species: condition	Processing plant 1	Processing plant 2
	p.p.b.	p.p.b.
Sable:		
Raw	4 and 4	4 and 4
Smoked	9	5 and 4
Smoked, nitrate-treated[2]	14 and 12	--
Smoked, nitrate-treated[2]	14 and 13	--
Smoked, nitrite-treated	--	8 and 9
Smoked, nitrite- and nitrate-treated	--	20 and 26
Salmon:		
Raw	0	0
Smoked	5	0
Smoked, nitrate-treated	16 and 17	--
Smoked, nitrite-treated	--	4 and 6
Shad:		
Raw	0	--
Smoked, nitrate-treated[3]	10	--
Smoked, nitrite-treated[3]	12	--

[1] Skin and bones were removed prior to analysis of sample.
[2] and [3] Identical samples, packaged differently.

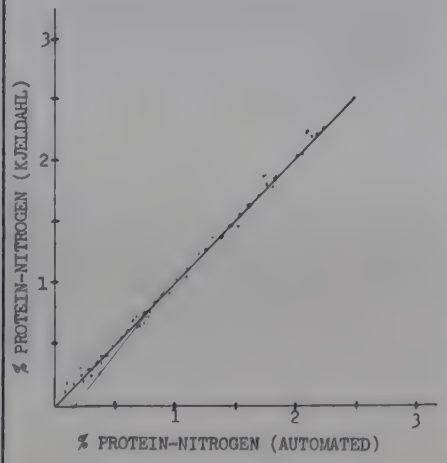
FTP

7.51

CORRELATION OF RESULTS OBTAINED BY AUTOMATED METHOD AND MANUAL KJELDAHL METHOD

Sample food	Method of analysis		Difference
	Automated	Kjeldahl	
	percent protein		
Chicken meat	21.3	21.0	+0.3
Beans & franks	7.2	7.0	+0.2
Beef - 1	32.0	32.8	-0.8
2	29.4	29.0	+0.4
3	29.1	28.2	+0.9
4	31.1	31.0	+0.1
5	28.7	28.3	+0.4
6	19.9	20.9	-1.0
Frankfurter - 1	11.4	11.7	-0.3
2	11.6	11.8	-0.2
Bone stock	60.0	62.0	-2.0
Soybeans - 1	30.3	30.2	+0.1
2	4.8	5.1	-0.3
Yeast	22.8	22.8	0
Wheat protein	14.2	13.9	+0.3
Dry Beans - 1	35.9	36.9	-1.0
2	22.9	23.4	-0.5

For all 40 samples tested:
Standard deviation of the differences ±0.54
Standard error of the difference 0.0817
t value 0.228



7.80 STATISTICAL ASPECT OF THE CORRELATION BETWEEN OBJECTIVE AND SUBJECTIVE MEASUREMENTS OF MEAT TENDERNESS

Gacula, M. C., Jr., June B. Reaume, K. J. Morgan, and R. L. Luckett (Armour and Company, Food Research Laboratory, 801 W. 22nd St., Oak Brook, Ill. 60521)
Journal of Food Science 36, No. 2, 185-189 (March 1971)

The purpose of this study was to present a method of analysis of data for minimizing extraneous sources of variation that influence objective and subjective measurements. The authors developed statistical models for the Warner-Bratzler method and taste panel method for evaluating tenderness of meat. They found that by expressing the experimental data as a deviation from their contemporary mean, extraneous sources of variation were minimized, resulting in a substantial improvement in the degree of correlation as theoretically expected. A contemporary mean was defined here as an average value derived from observations collected in the same substratum (the substratum is assumed to be homogeneous by virtue of proper experimental design).
[5 figures, 2 tables, 23 references] FTP

7.86 NEW METHOD OF ISOLATING SALMONELLAE FROM MILK
(0.5)

Wells, Joy G., George K. Morris, and Philip S. Brachman (Epidemiology Program, Center for Disease Control, Atlanta, Ga. 30333)
Applied Microbiology 21, No. 2, 235-239 (February 1971)

The presently accepted method for isolating salmonellae from liquid milk is a modification of the procedure of W. R. North, Jr. [J. Bacteriology 80, 861 (1960)]. The purpose of the present study was to evaluate the recommended method for examining raw whole milk for salmonellae and to develop a procedure more applicable to field conditions. A method for analyzing milk should be sufficiently sensitive to detect fewer than 10 salmonellae per liter of milk.

The authors found that use of a cotton gauze swab and subsequent culture of the swab is a more sensitive method for isolating Salmonellae from liquid milk than is the revised procedure of North. An incubation temperature of 43° C. is better than 37° C. for isolating salmonellae from the swabs; good results were obtained at the 43° C. incubation temperature even when Salmonellae was present at levels as low as one per liter. Both Bismuth sulfite agar and Brilliant Green sulfadiazine agar should be used as the plating media to give maximal isolations. [4 tables, 14 references] FTP

8.42 POTASSIUM, SODIUM, MAGNESIUM AND CALCIUM CONTENTS OF
(1.31)(9.13) CHINOOK SALMON TISSUES DURING VARIOUS STAGES OF THE LIFE CYCLE

Snodgrass, P. J. (Department of Medicine, Harvard Medical School and Peter Bent Brigham Hospital, Boston, Mass.), and J. E. Halver (Bureau of Sport Fisheries and Wildlife, Western Fish Nutrition Laboratory, Cook, Wash.)
Comparative Biochemistry and Physiology 38, No. 1A, 99-119 (January 1, 1971)

The authors determined the cation composition of the plasma, red cells, brain, heart, muscle, liver, kidney, and gills of Chinook salmon (Oncorhynchus tshawytscha during four stages of the life cycle: as juveniles in fresh water; as juveniles 2 weeks after they entered sea water; as mature adults in the ocean; and as spawning adults after 3 or 4 months of fasting. Although plasma cation concentrations changed significantly with each change in the fish's ionic environment, cellular cation composition (except for the juveniles in sea water) remained remarkably stable. The reduction in the K/N ratios in the brain, heart, liver, kidney, and gills of the juveniles newly living in sea water suggests that at 2 weeks they have not completed their adjustment to the new environment. The normal K/N ratio in the muscle of the spawning salmon led the authors to question the hypothesis that pathological hyperadrenocorticism occurs at this stage of the life cycle. [6 figures, 8 tables, 30 references] LB

7.9 A SPECIFIC METHOD FOR THE ASSAY OF SELECT CHLORINATED PESTICIDES
(9.19)

Sadar, Muhammad H., and George G. Guilbault (Department of Chemistry, Louisiana State University in New Orleans, New Orleans, La. 70122)
Journal of Agricultural and Food Chemistry 19, No. 2, 357-364 (March-April 1971)

Very selective and sensitive enzymic methods are available for determining organophosphorus and carbamate pesticides but no good methods (enzymic) have been found for the assay of chlorinated pesticides. In the present work the authors studied the effect of 21 different pesticides on the enzyme hexokinase. The pesticides consisted of chlorinated hydrocarbons (aldrin, chlorodane, DDT, heptachlor, DDD, DDE, dieldrin, kelthane, methoxychlor, lindane), organophorous compounds (paraoxon, parathion, guthion, malathion, methyl parathion, DDVP), carbamates (sevin, rotenone), and herbicides (2,4-D acid, 2,5-T acid, dalapon). Hexokinase catalyzes the phosphorylation of glucose by the coenzyme adenosine triphosphate. The rate of formation of the fluorescent resorufin in the system is measured; the rate is proportional to the concentration of hexokinase present and hence to the concentration of inhibitor.

Hexokinase is inhibited by only four chlorinated pesticides--aldrin, chlorodane, DDT, and heptachlor. The authors found that as little as 10^{-6} M concentrations of these pesticides (100 p.p.b.) can be specifically detected in the presence of all the other pesticides with a precision and accuracy of about 2%. [1 figure, 3 tables, 11 references] FTP

8.51 STUDIES ON BLOOD PROTEINS OF MACKEREL
(1.11)

Naevdal, Gunnar (Inst. of Mar. Res., Bergen, Norway)
Fiskeridir. Skr. Havundersøk. 15, No. 5, 573-582 (1970)
Sport Fishery Abstracts 15, No. 4, Abstract No. 12620, 381-382 (1970)

Fourteen samples of mackerel, about 1800 specimens, from the North Sea and the Norwegian Coast were analysed by agar gel electrophoresis (hemoglobins) and combined starch and agar gel electrophreosis (serum proteins and serum esterase). Hemoglobin variations related to ontogeny appeared during the first year of the mackerel's life. In mackerel one year and older normally one strong hemoglobin component occurred. Two strong components were observed in some specimens (probably heterozygotes) but too infrequently to be used for studies on population units. In the serum proteins were found extensive variations, but the greater part of the variations occurred in very weak bands, or the observed phenotypes were somewhat unstable. Normally one transferrin band was seen, but also a double band pattern (probably heterozygote) were observed although too infrequently to be used in studies of population units. Five esterase components could be clearly distinguished, and a few more were indicated. Each of the components seemed to be controlled by one gene in a series of polyalleles, although some samples showed a significant excess of observed homozygotes according to this theory. No significant variations in gene frequencies between the samples were found. The results also were in accordance with corresponding results from the southern North Sea and the areas south of the British Islands. (Auth. summ.) Reprinted

7.9 (9.19) DIFFERENTIATION OF POLYCHLORINATED BIPHENYLS FROM DDT BY CARBON-SKELETON CHROMATOGRAPHY

Asai, Richard I., Francis A. Gunther, William E. Westlake, and Yutaka Iwata (Department of Entomology, University of California, Riverside, Calif. 92520)
Journal of Agricultural and Food Chemistry 19, No. 2, 396-398 (March-April 1970)

This study involved the application of carbon-skeleton chromatography to the qualitative differentiation between polychlorinated biphenyls (PCBs) and DDT. [A description of the carbon-skeleton chromatography technique and its analytical applications may be found in a review by M. Beroza and R. Coad (J. Gas Chromatogr. 4, 199 (1966).]

The PCBs and biphenyl yielded identical carbon-skeleton chromatograms that were strikingly different from that of DDT. The products formed at 300° C. catalyst temperature were cyclohexylbenzene and biphenyl, and at 260° C. catalyst temperature they were cyclohexylbenzene and a small amount of bicyclohexyl.
[3 figures, 6 references] FTP

8.51 (1.34) AMINO ACID COMPOSITION OF THE SPAWN AND BODY TISSUES OF THE MARITIME PINK SALMON

Nasedkina, E. A., and N. F. Pushkareva (TINRO)
Rybnoe Khozyaistvo, pp. 53-56 (December 12, 1969)
Robert M. Howland, Bur. of Sport Fisheries and Wildlife, Narragansett, R.I. (trans.)
Sport Fishery Abstracts 15, No. 4, Abstract No. 12603, 377 (1970)

The total content of free amino acids increases according to the degree of ripeness of the spawn especially such as glutamic acid with threonine and tyrosine. The content of the other amino acids remains practically unchanged, with the exception of arginine, which apparently proceeds to the formation of creatine, urea, ornithine, etc. Fertilized spawn contains less free amino acids than the spawn of females before spawning. Fry at the end of nurturing differed from the earlier fry by a lower content of free amino acids. Especially acutely decreased is the content of essential amino acids, which lowers their survivability. In connection with having started feeding, the total content of free amino acids in the tissues reached 210 mg%. The increase occurred due to tyrosine, valine and methionine, phenylalanine and leucine, i.e. all amino acids which proceed in the organism from the liver through the blood and play a large role in the growing organism. Analyses showed that the kidneys and liver (177.3 and 267.0 mg%) of adult fish have the highest content of free amino acids, especially after spawning. The least amounts of amino acids are in the muscles of the fish (stages of ripeness III-IV) and in the testes - at stages II-III. The kidneys differ from the other parts of the body by the presence of cystine (to 3.5 mg.%) and increased content of alanine (to 63 mg%). In the testes in contrast to the other organs lysine occurs only as traces. Reprinted

7.89 TEST TO DETERMINE WHETHER SHUCKED OYSTERS HAVE BEEN FROZEN AND THAWED

Gould, Edith, and Michael J. Medler (U.S. Department of the Interior, Bureau of Commercial Fisheries Technological Laboratory, Emerson Ave., Gloucester, Mass. 01930)
Journal of the Association of Official Analytical Chemists 53, No. 6, 1237-1241 (November 1970)

The authors describe a test that can be used to determine whether chilled shucked whole oysters have been frozen and thawed. Apparently, latent forms of malic enzyme in the oyster are solubilized by freezing and thawing and can be differentiated from the normally soluble form of malic enzyme activity by their differing rates of electrophoretic migration under the conditions described in the paper.
[2 figures, 3 references] FTP

8.51 (1.83) CHEMICAL COMPONENTS OF ABALONE MEAT

Takayama, Naoko, Yoshio Yamamoto, Yoko Kadowaki, and Kinji Endo (Japan)
Chemical Abstracts 74, No. 5, 21979u (February 1, 1971)

8.51 PROTEINS OF COLD-ADAPTED ANTARCTIC FISHES

Komatsu, Stanley K. (Univ. of California, Davis, Calif.)
Chemical Abstracts 74, No. 5, 20759k (February 1, 1971)

8.53 (1.86) LIPID CONTENT OF THE ORGANS OF THE COCONUT CRAB, BIRGUS LATRO (L.) (DECAPODA, PAGURIDEA)

Lawrence, J. M. (Department of Zoology, University of South Florida, Tampa, Fla. 33620)
Crustaceana 19, No. 3, 264-266 (November 1970)

The hepatopancreas of two male coconut crabs contained high lipid levels, 50 and 58% of the dry weight; the testis, 20 and 37%; the intestine and gills, 10 and 7%, respectively; and the thoracic and claw muscle, 4 and 3%, respectively. The levels of neutral lipids were extremely high in the hepatopancreas, 90 and 93% of the total lipid for the two specimens. In the testis, neutral lipid was 64 and 72% of the total lipid; in the intestine and gills, 48 and 41% of total lipid; and in the thoracic and claw muscle, 77 and 73%, respectively.
[7 references] LB

8.59 (3.30)(1.120) A COMPARISON OF THE HYPOXANTHINE CONTENT OF RAW TUNA MUSCLE TO THE CANNED PRODUCT

Crawford, Ladell (U.S. Department of the Interior, Fish and Wildlife Service, Bureau of Commercial Fisheries, 300 S. Ferry Street, Terminal Island, Calif. 90731)
Bulletin of the Japanese Society of Scientific Fisheries 36, No. 11, 1136-1139 (November 1970)

Several investigators have related the hypoxanthine (Hx) content of fish muscle to the storage time of the fish and to the quality of the meat. The present author reports a significant relation ($P = 0.001$) between Hx content of raw albacore, bluefin, and yellowfin tuna and the canned product of each. (His preliminary analyses show that this relation may also be true for skipjack.) Assuming that y is the Hx in the canned product and x is the Hx in the raw tuna, he compared the regression equations for y over x and found that the relations were linear for all three species. The relation between the Hx content of albacore stored in refrigerated sea water and on ice and the flavor of the meat was also investigated; the relation was also highly significant ($P = 0.001$).
[1 table, 7 references] LB

8.59 OSMOTIC AND IONIC CONCENTRATIONS IN SOME ALASKAN FISH AND GOLDFISH FROM DIFFERENT TEMPERATURES

Prosser, C. Ladd, William Mackay, and Kenneth Kato (Department of Physiology and Biophysics, University of Illinois, Urbana, Ill.)
Physiol. Zool. 43, No. 2, 81-89 (1970)
Sport Fishery Abstracts 15, No. 4, Abstract No. 12613, 380 (1970)

The osmoconcentration of plasma of zoarcid and stichaeid fish taken from relatively deep water of uniformly low temperature is higher than that of fish from regions of higher and more fluctuating temperature. Osmotic differences are due mainly to sodium chloride in plasma; potassium concentration is correspondingly higher in muscle. Resting potentials in muscles of stichaeids and soles indicate similar relative permeabilities to ions. Goldfish acclimated to 5C have significantly lower plasma sodium and chloride concentrations and lower muscle potassium than when acclimated to 15 and 25C. It is suggested that the generally higher salt concentrations in marine fish at low temperatures and lower concentrations in fresh-water fish in the cold may be compensations toward reduced osmotic work, and that shifts in ion concentrations may be limited by membrane tolerances. (Authors summ.) Reprinted

8.8 (0.5) MICROBIOLOGY OF FROZEN CREAM-TYPE PIES, FROZEN COOKED-PEELED SHRIMP AND DRY FOOD-GRADE GELATIN

Leininger, H. V., L. R. Shelton, and K. H. Lewis (National Center for Microbiological Analysis, Division of Microbiology, Food and Drug Administration, Department of Health, Education, and Welfare)
Food Technology 25, No. 3, 28-30, 33 (March 1971)

Three commercial food products (cream-type pies, cooked peeled shrimp, and gelatin) were examined microbiologically. A total of 204 packages (representing 21 samples) of cooked-peeled shrimp from nine producers was tested. The data on shrimp are shown in the table that follows.

(over)

8.59 (1.30)

STUDIES ON ENZYMES OF CULTIVATED SALMONOID FISHES - I. ACTIVITIES OF PROTEASE, AMYLASE, ARGINASE, GPT (GLUTAMIC-PYRUVIC TRANSAMINASE) AND GOT (GLUTAMIC-OXALOACETIC TRANSAMINASE)

Onishi, Toshio, and Shigeo Murayama
Bull. Tokai Fish. Res. Lab., No. 59, 111-119 (1969) (In Japanese with English abstract)
Sport Fishery Abstracts 15, No. 4, Abstract No. 12615, 380 (1970)

Activities of enzymes in eight species of salmonids reared on a commercial diet for 22-23 months at Nikko Trout Hatchery were studied. The activity of protease in pyloric caeca was highest in brook trout. Cherry salmon and lake trout came next, but they were far lower than brook trout. The brown trout was lowest. The activity of stomach protease did not differ much by species. Comparing the activity of amylase on pyloric caeca, stomach, intestine and liver, the first one was found to be highest irrespective of the species of fish. Comparing the species by the amylase activity of the pyloric caeca, the rainbow trout including its albino form was found to be the highest of the eight species. Hepatic arginase differed considerably by sex. The mature male showed higher activity than the female and the immature one. It seemed that hepatic arginase is connected with increase of gonadal protaminé with maturation. Fish of the genus Oncorhynchus showed higher activity than did those of Salmo and Salvelinus. The hepatic GPT activity was high in lake trout, Japanese char and brown trout. Hime salmon showed the lowest. The hepatic GOT activity did not differ much by species though lake trout was the highest and hime salmon the lowest. (Authors) Reprinted

8.8 (0.5)

Samples		Geometric mean values of aerobic plate counts of cooked-peeled shrimp	Samples		Geometric mean values of Most Probable Number of coliform organisms per gram of cooked-peeled shrimp
Number	Percent of total number (21)		Number	Percent of total number (21)	
11	52	Up to 50×10^3	11	52.4	None detected in 1/10 gram
3	14	$>50\times10^3$ to 100×10^3			
1	5	$>100\times10^3$ to 200×10^3	5	23.9	0.3 to 1.7
0	--	$>200\times10^3$ to 300×10^3	4	19.0	3.9-12.0
1	5	$>300\times10^3$ to 400×10^3	1	4.7	21.0
1	5	$>400\times10^3$ to 500×10^3			
2	10	$>500\times10^3$ to 700×10^3			
0	--	$>700\times10^3$ to $1,000\times10^3$			
2	10	$>1,000\times10^3$			

[5 tables, 8 references] FTP

8.8 (2.02)

CURRENT STUDIES ON THE CHEMISTRY OF THE FRESHNESS OF FISH WITH SPECIAL REFERENCE TO NUCLEIC ACIDS AND THEIR RELATED COMPOUNDS

Uchiyama, Hitoshi, and Shigeo Ehira (Tokai Reg. Fish. Res. Lab., Tokyo, Japan)
Chemical Abstracts 74, No. 11, 52175h (March 15, 1971)

8.53 (1.89)

THE LIPID COMPOSITION OF THE ORGANS OF TWO SPECIES OF TROPICAL CHITONS

Lawrence, John M. (Department of Zoology, University of South Florida, Tampa, Fla. 33620)
Caribbean Journal of Science 10, No. 1-2, 1-3 (March-June 1970) (University of Puerto Rico, Faculty of Arts and Sciences, Mayagüez, Puerto Rico 00708)

The lipid levels in the ovaries, testes, digestive glands, and mantles of Acanthopleura granulata and Chiton tuberculatus were measured. In the ovaries and testes, the levels of total lipid were similar for both species; the lipids were composed of equal amounts of neutral and polar lipids. In the digestive glands, the levels of total lipid were also similar; the lipids there, however, were mainly neutral. In the mantle, the level of total lipid was much higher in A. granulata than in C. tuberculatus; although the lipids in both species were primarily neutral, A. granulata had a higher level of neutral lipid than C. tuberculatus had.
[1 table, 5 references] LB

8.59 (1.70)

SINKING FACTORS AND AVERAGE DENSITIES OF FLORIDA SHARKS AS FUNCTIONS OF LIVER BUOYANCY

Baldridge, H. David, Jr. (Mote Marine Laboratory, 9501 Blind Pass Road, Sarasota, Fla. 33581)
Copeia, No. 4, 744-754 (December 12, 1970)

The primary factor affecting specific gravity in sharks of the same species was shown to be the buoyancy provided by the liver. The content of low-density oil in shark livers varies with the size, species, and physical condition of the shark. The author developed procedures for determining the average density (conventional specific gravity) and the sinking factors (specific gravity relative to sea water at ambient temperature) for large, dead (or anesthesized) sharks.
[2 figures, 2 tables, 13 references] LB

8.8 (0.5)

PREVALENCE OF CLOSTRIDIUM BOTULINUM IN SEMIPRESERVED MEAT PRODUCTS

Abrahamsson, Kerstin, and H. Riemann (Department of Epidemiology and Preventive Medicine, University of California, Davis, Calif. 95616)
Applied Microbiology 21, No. 3, 543-544 (March 1971)

The authors examined 372 samples from 14 different types of semipreserved meat products for Clostridium botulinum. Five samples from one type of meat product contained C. botulinum type A, and one sample of another type of meat product contained C. botulinum type B. The authors suggest that the overall C. botulinum prevalence in meat and meat products is low.
[1 table, 5 references] FTP

8.53 (1.92)(1.4)

FATTY ACID AMIDE IN FISHES

Nakamura, Takashi, and Masamichi Toyomizu (Fac. Agr., Kyushu Univ., Fukuoka, Japan)
Chemical Abstracts 73, No. 25, 128214x (December 21, 1970)

9.10 (9.2) (1.01) BIOLOGICAL RESOURCES OF THE WORLD'S OCEANS AND THEIR UTILIZATION

Moiseev, P. A. (All-Union Research Institute for Marine Fisheries and Oceanography, Moscow, U.S.S.R.)
Western Fisheries 81, No. 4, 14, 41-43 (January 1971)

Many of the developing countries have been encouraged to look to the biological resources of the ocean for the animal protein needed by their rapidly growing populations. Rough estimates show that between 130 and 140 million tons will be needed to relatively satisfy the planet's requirements for food products of aquatic origin in the year 2,000. Since the annual increase in catch in recent decades has been about 3 million tons, many people consider the prospects of such fishery development quite realistic. The author considers them questionable.

The most productive ocean zones are characterized by a daily carbon production of over 1.2 g./m.^{2} and by a zooplankton biomass of over 100 mg./m.^{3}. These zones make up only 17% of the total ocean area; zones characterized by a low level of productivity similar to that of deserts on land make up about 63%. The total production of phytoplankton is about 100 billion tons and that of zooplankton and bottom organisms about 56 billion tons; however, only about 16 billion tons of the latter enters the food chain that feeds fish.

Using experimental coefficients calculated for the Caspian, Azov, North, Baltic, and Black Seas, the author estimates that this amount of zooplankton and bottom organisms can feed between 300 and 320 million tons of fish and big invertebrates. Assuming that 25 or 30% of these fish can be caught, he estimates the total world catch at about 90 million tons. Using another method of calculation, H. T. Odum's (in which the areal extent of zones of different productivity is considered, along with the level of fish production within similar zones where the

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9.10 (9.6) FISH BEHAVIOUR

Barton, Robert (reviewer)
In FAO Fisheries Reports No. 62, Vol. 3. Proceedings of the FAO Conference on Fish Behaviour in Relation to Fishing Techniques and Tactics (1970)
World Fishing 19, No. 10, 52-53, 56-57, 61-62 (October 1970)

The papers presented at the FAO conference on fish behavior (Bergen, Norway, 1967) have been issued in a three-volume set. The ones reviewed here concern the reaction of fish both to single stimuli--such as light, sound, salinity, temperature, electricity, and water movement--and to multiple stimuli--such as fishing gear. These stimuli trigger reaction only in accordance with the fish's receptor system--that is, the fish's sensory acuity, conditioned reflex activity, and acquired responses, all of which may vary with the season, the time of day, environmental factors, and the fish's biotic relations. The behavior pattern of the fish, then, must be constructed in terms of a frightening complex of interlocking variables. It can be based on (1) the effect of individual stimuli on each receptor, (2) the effect of a single stimulus on a particular fish, or (3) the effect of multiple stimuli on a collection of similar fish. From this last, only generalized conclusions can be drawn.

The 24 papers reviewed here give a cross section of all these methods. They also give a summary view of trends and directions of fishery science in Great Britain (8 papers), U.S.S.R. (7 papers), the United States (3 papers), and Ghana, Yugoslavia, The Philippines, Japan, West Germany, and Canada (1 paper each).
[6 figures, 24 references] LB

9.10 LAKE VOLTA -- A PROGRESS REPORT

Petr, Tomislav (Department of Zoology, Makerere University, Kampala, Uganda)
New Scientist and Science Journal 49, No. 736, 178-182 (January 28, 1971)

Lake Volta, which was formed when the Akosombo Dam was built across Ghana's Volta River, is the largest manmade lake in the world. It extends some 380 km. northward along the main axis of the river and covers more than 8,000 sq. km. of land. Owing to lack of money, practically no vegetation was cleared before the lake began to fill; thus an enormous amount of organic matter was added to that in the flooded soil. Because an understanding of the biological characteristics of Lake Volta can contribute to the planning, development, use, and conservation of other lakes formed in this manner, the author investigated the effect of the added nutrients on oxygen concentrations in the water and on the lake's fish productivity.

In the open water of the lake, as distinguished from the protected waters in the long gorge leading to the dam, the steady winds blowing for most of the year cause sufficient water movement to allow well-oxygenated surface water to be carried downward some 20 m. to the discontinuity layer. As the level of the lake rises and water is discharged through turbines and spillways, the water is mixed more extensively and oxygen becomes more available in the deeper water. As a result, conditions have become increasingly conducive to a productive fishery.

Except when they suddenly began to die immediately after the dam was closed, the fish initially flourished in the new environment. Later, however, many species disappeared, either because they had returned to their normal fast-flowing river habitat or because they were fished out or for some other reason. In any event, their disappearance was not due to death from lack of oxygen, since no

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9.12 (1.019) BIOLOGIE COMPARÉE DE QUELQUES POISSONS ANTARCTIQUES (NOTOTHENIIDAE) [COMPARATIVE BIOLOGY OF SOME ANTARCTIC FISHES (NOTOTHENIIDAE)]

Hureau, Jean-Claude (Muséum national d'histoire naturelle, Laboratoire des pêches outre-mer, 57, rue Cuvier, 75 - Paris V, France)
Bull. Inst. océanogr. Monaco 68, No. 1391, 1-244 (1970) (In French; Russian and English summaries)

The Nototheniidae constitute about 60% of the species and almost all the individual fishes in Adélie Land and the Kerguélen Islands, the Antarctic regions studied. The author has divided his report of these fishes into six chapters:

I - Ecological conditions (geographic and topographic, climatological, hydrological, and biotic factors)

II - Systematic study of Nototheniidae (position in the classification, systematics and description of the species, morphometric data, biogeography, and general biology)

III - Growth (methods used to determine age, growth of the six different species studied)

IV - Dietary habits (including the methods used)

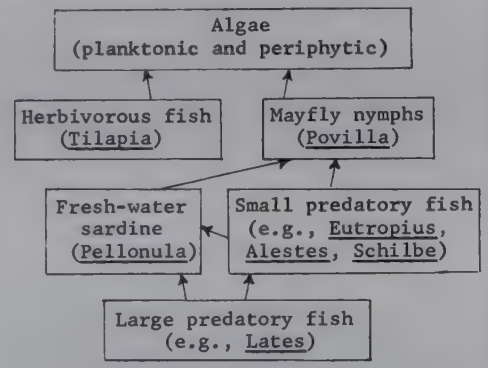
V - Reproduction (the gonads and their cycle, and the role of the liver in fat metabolism)

VI - Study of the thyroid gland (the anatomy and the annual cycle of the thyroid gland; the relation between the thyroid cycle, the sexual cycle, and growth as functions of external physicochemical and internal endocrine factors. The author shows in detail that these fishes, which are adapted to the specific ecological conditions, have much more active biological reactions--such as growth, sexual

 (over)

9.10

major fish kills occurred after the first few months. Whereas such fish as Mormyridae and Characidae have largely disappeared from the lake, others--such as the Nile perch (Lates niloticus), Tilapia, and the fresh-water sardine--have become quite numerous. And the very vegetation that caused so much worry originally can be given the credit. Vast numbers of mayflies have colonized the submerged trees. These insects, along with the algae that attach themselves to the submerged wood and the invertebrates that inhabit them, have become an integral part of the lacustrine food chain.



The question now arises: What will happen to the fishery when the trees are destroyed by the burrowing activities of Povilla and by the normal processes of rotting? Should the fisheries be managed on the basis of sustainable yield, or, since productivity is destined to decrease substantially, should they be geared for maximum harvests? What investments, both capital and sociological, should be made in a potentially short-term fishery? The author hopes that continued research on Lake Volta will provide the answers.
[5 photographs] LB

9.10 (9.2)(1.01)

present catch is close to the maximum sustainable yield), he arrives at a figure of 80 million tons for the probable catch of commercial species. On the basis of still another method, he again arrives at a total catch of 90 million tons. This method is based on the assumption that the annual primary production in the ocean is 20 billion tons of carbon, containing 160^{15} kilocalories of energy, and that the mean annual fish catch is 167 kg./km.^{3} and contains 60×10^{12} kilocalories. The fish catch, then, amounts to about 0.04% of the total primary production of the ocean, or about 0.06% of that in the more fruitful parts of the ocean. Applying a coefficient as high as 0.10% (0.10% is the figure for primary production in such highly productive waters as the Caspian Sea), the author figures that the total catch of the ocean may eventually amount to 90 million tons. Yet a fourth method of estimating potential catch is based on the phosphorus balance in sea water. About 300,000 tons of phosphorus is removed annually in the fish catch--7% of the supply the ocean receives from the land. In heavily fished seas such as the Caspian and the Azov, where the maximum sustainable yield has almost been reached, about 10% of the total annual inflow of phosphorus is removed with the fish. Postulating that 10% of the annual supply of phosphorus will be removed from the ocean, too, in the form of fish, the author estimates a total catch of between 80 and 90 million tons.

All these estimates include only fish and larger invertebrates, no macroplankton such as euphausiids, which may some day be caught by the tens of millions of tons. They indicate that, since the present catch is about 65 million tons, the total world catch can be increased by about 25 or 30 million tons. The greatest potential for achieving this increase is by development of fisheries in the southern hemisphere, where marine resources have been much less heavily exploited than in the north. However, the author looks forward to a change from the present-day mode of fish hunting to a future of better controlled fishery management. LB

9.12 (1.019)

cycle, thyroid cycle--than do fish from temperate waters that may have been acclimatized to the same ecological conditions.)
[89 figures, 70 tables, 172 references] LB

9.12 RESPONSES OF SOME ANADROMOUS FISHES TO VARIED OXYGEN CONCENTRATIONS AND INCREASED TEMPERATURES

Dorfman, Donald, and James Westman (Rutgers - The State Univ., New Brunswick, N.J.)
Selected Water Resources Abstracts 3, No. 18, 39 (1970)
Sport Fishery Abstracts 15, No. 4, Abstract No. 12782, 419 (1970)

Striped bass, Roccus saxatilis, white perch, Roccus americanus, American shad, Alosa sapidissima, blueback herring, Alosa aestivalis, and alewives, Alosa pseudoharengus, were studied to determine their survival, responses and growth in reduced concentrations of dissolved oxygen. The upper thermal limits and tolerance were also determined for striped bass, white perch and alewives. Diurnal concentrations of dissolved oxygen were provided at levels similar to those occurring in the Philadelphia - Camden region of the Delaware River. Special tanks were constructed for establishing gradients of dissolved oxygen. Reprinted

9.12 (1.85) STERNAL SPINES AS A CHARACTERISTIC FOR DIFFERENTIATING BETWEEN FEMALES OF SOME PANDALIDAE

McCrary, Jerry A. (Alaska Department of Fish and Game, Division of Commercial Fisheries, Kodiak, Alaska)
Journal of the Fisheries Research Board of Canada 28, No. 1, 98-100 (January 1971)

This article describes, for certain species of pandalid shrimps in Alaska, a method by which females that had spawned previously may be distinguished from those females that had not spawned previously. Differentiation of such females is essential in life history studies to determine accurately the age-class structure and survival rates of shrimp. Pandalus borealis, P. goniurus, P. hypsinotus, and Pandalopsis dispar have a series of small spines on the median ventral surface of the abdomen. Except for P. dispar, the sternal spines are present during the postlarval life of the shrimp until the first molt into breeding dress as a female. Only the sexually mature females that are very near egg extrusion undergo this molt. At that time the sternal spines are completely lost or are reduced to minute protuberances. Females that extruded eggs during an earlier spawning season can be identified, between spawning seasons, because they do not have abdominal spines or have only minute protuberances. Therefore, those females that have sternal spines during any time of the year have not previously spawned. The characteristic is useful during the period between successive spawning seasons as an effective tool in determining the number of females surviving one or more spawnings.
[1 figure, 1 table, 3 references] FTP

9.125 (2.12) AUDITORY FREQUENCY DISCRIMINATION IN THE GOLDFISH (CARASSIUS AURATUS)

Fay, Richard R. (Auditory Research Laboratories, Princeton University)
Journal of Comparative and Physiological Psychology 73, No. 2, 175-180 (November 1970) (American Psychological Association Inc., 1200 Seventeenth Street, N.W., Washington, D.C. 20036)

Studies of frequency discrimination in animals have been almost exclusively concerned with the cat. Animals with more diverse and transitional ears--for example, fish, amphibians, and reptiles--have been largely neglected. Yet fish are of particular interest because the anatomical structure of their ears gives no evidence suggesting any sort of place principle of frequency representation. In this study, the author tried to determine the frequency difference thresholds for four goldfish at seven points between 50 and 1,000 Hz (at 50, 100, 200, 400, 600, 800, and 1,000 Hz) so that he could specify quantitatively the threshold-frequency function. Thereby he would be able to make a meaningful comparison between the auditory discrimination abilities of the fish and those of other animals.

The difference thresholds for the goldfish increased monotonically from 3.5 Hz at 50 Hz to 47 Hz at 1,000 Hz. Up to 400 Hz, the slopes of the frequency-threshold functions for fish and man are identical, although man is about one order of magnitude more sensitive in his ability to discriminate frequency. Above 400 Hz, the goldfish's discrimination ability declines relative to man's, probably because of a frequency-doubling effect in its auditory nerve fibers. The author concludes that the mechanisms for analyzing frequencies below 1,000 Hz are probably similar in man and fish. [5 figures, 19 references] LB

9.16 FISH-GROWING AQUARIUM

Carmouche, William Jeter (353 Stanford Ave., East Baton Rouge, La. 70808) (pat.)
U.S. Patent 3,565,043 (Feb. 23, 1971)

Present methods of cultivating food fish require heavy investments in pond construction and operation. Ponds must be periodically drained so the fish can be harvested or the pond reconditioned; feed must be distributed manually or by expensive mechanical equipment; costly aerators and water agitators must be installed to maintain a healthy environment for the fish. Yet only about 2,000 lb. of fish can be raised per acre per year under these conditions. The aquarium described here automatically irrigates and aerates fish ponds, feeds the fish, removes waste matter, and reduces the incidence of fish diseases and parasites (while permitting convenient and economical application of treatment when necessary). The same amount of water and power used in a conventional 40-acre pond to grow 80,000 food fish is all this system needs to grow 1,000,000.

The aquarium has two compartments. In the upper compartment, fry and fingerlings are grown to maturity. This section includes a controlled-water spray and a water wheel, the buckets of which operate in a manner to dispense food at determined intervals. Separating this compartment and the lower, flushing compartment is a slanted partition down which waste matter slides toward a waste opening.

The lower compartment is airtight when the air valve and waste opening in the partition are closed. A stopper in the waste opening is adjusted so that water and waste particles flow through the opening. As the water in the flushing compartment increases, the air space decreases, causing air to be pressed through the air valve. As the air enters the upper compartment, it aerates the water there

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9.15 (9.17)(1.37) TIME-DEPENDENT CHANGES IN TOXICITY OF ROTENONE DISPERSIONS TO TROUT

Loeb, Howard A., and Robert Engstrom-Heg (Bureau of Fish Laboratory, New York State Conservation Department, Livingston Manor, N.Y.)
Toxicology and Applied Pharmacology 17, No. 3, 605-614 (November 1970)

Emulsified rotenone preparations are commonly used to remove unbalanced, ill-adapted, or stunted fish populations from lakes and streams. The typical preparation is photochemically unstable, readily undergoing oxidative decomposition in the presence of strong light and high temperatures. Thus, treated waters can become nontoxic to fish in a matter of days or weeks. Where rotenone-bearing waters enter domestic water supplies, more rapid detoxification is required. To help meet this need, the authors investigated the detoxification phenomenon in an effort to establish standards for the preparation and use of rotenone dispersions having time-constant toxicity.

Freshly prepared aqueous dispersions of 5% emulsified rotenone became more toxic to trout upon standing (probably reflecting a transition from the colloidal to the dissolved state), the toxicity increasing rapidly at elevated temperatures. After the initial increase at 47° F., toxicity remains almost constant for at least 10 days. At 65° F., 1 p.p.m. of the dispersion may become suddenly nontoxic to the fish at any time between 2 and 7 days after preparation; but when an additional 1 p.p.m. is added after detoxification, a second rapid detoxification occurs--this time after a shorter latent period. A longer latent period in dispersions prepared with sterilized water suggests that the catalytic substance which probably

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9.19 (9.13) HEAVY METALS AND THE FERTILIZATION OF RAINBOW TROUT EGGS

Shaw, T. L., and V. M. Brown (Water Pollution Research Laboratory, Elder Way, Stevenage, Hertfordshire, England)
Nature 230, No. 5291, 251 (March 26, 1971)

Three lots of eggs obtained by ovarian section from a freshly killed rainbow trout (Salmo gairdneri Richardson) were placed in glass beakers and fertilized with 2 liters of milt-containing water. To one beaker, a solution of copper sulfate was added in a quantity sufficient to give metal ion concentrations of 1 mg. Cu^{++} per liter; to another, nickel sulfate was added to give concentrations of 1 mg. Ni^{++} per liter; eggs in the third served as control. Differences between the percentage of treated and untreated eggs that were fertilized were statistically insignificant ($P>0.05$). However, eggs in the metal solutions developed faster than did the controls, particularly those in the copper, all of which hatched before any of the controls did. But once hatching began, the rate of hatching was significantly faster for both control eggs and eggs in the nickel solution.

Since the concentrations of copper and nickel to which the eggs were exposed are higher than those even in badly polluted British rivers, the authors doubt that either of these two poisons will impair fertilization in trout. However, they question the long-term effects of the fish's being continuously exposed to these two heavy metals. [1 figure, 2 tables, 4 references] LB

9.15 (9.17)(1.37)

accumulates and causes the breakdown of the rotenone may be an enzyme or other microbial product.

The authors conclude that the time that elapses following preparation must be considered in any work with rotenone dispersions--and probably with other colloidal toxicants. At 65° F., no major changes in toxicity will occur in dispersions that are used within 1 to 48 hr. of preparation; at 47° or 48° F., little change will occur if the dispersion is used between 3 hr. and 10 days of preparation. [6 figures, 2 tables, 11 references] LB

9.16 FERTILIZING FARM FISH PONDS

Swingle, H. S. (Dept. of Zoology-Entomology, Auburn Univ., Auburn, Ala.)
Highlights of Agriculture Research 12, No. 1, 11 (1965) (Agricultural Experiment Station of Auburn University, Auburn, Ala.)
Sport Fishery Abstracts 15, No. 4, Abstract No. 12558, 365-366 (1970)

It was originally recommended that fertilizer be applied by broadcasting over shallower water areas, or by pouring it in a line 15 to 20 ft. from the shoreline around shallower parts of the pond. Later it was found that less fertilizer was required and better results were obtained if fertilizer was placed on a platform about 1 ft. under water. Wind and waves were effective in distributing nutrients throughout the pond as they dissolved from fertilizer on the platform. Circulation of nutrients in top waters reduced the amount of fertilizer required annually by 20% to 40%. After a few years of fertilization, a "complete fertilizer" is no longer necessary. Nitrogen and potassium can be omitted. However, continued use of phosphate is necessary. (From auth.) Reprinted

9.13 (1.92) UREA IN SOME FRESHWATER TELEOST FISH

Vellas, F., Martin Flavin, Yves Creach, and M. Dassain (Lab. Biol. Anim., Fac. Sci., Toulouse, France)
Chemical Abstracts 74, No. 5, 20752c (February 1, 1971)

9.14 (6.51) FEED FOR FISH

Sata, Takaji, and Hisashi Tanaka; Tanabe Seiyaku Co., Ltd. (pat.)
Japanese Patent 16058/70
Chemical Abstracts 74, No. 3, 12036g (January 18, 1971)

9.13 (0.4) ANTIBODY SYNTHESIS IN LYMPHOID ORGANS OF TWO MARINE TELEOSTS

Ortiz-Muniz, Gabriel (Department of Microbiology, University of Miami School of Medicine, Miami, Fla. 33155), and M. Michael Sigel (Lerner Marine Laboratory, Bimini, Bahama)
Journal of the Reticuloendothelial Society 9, No. 1, 42-52 (January 1971) (Academic Press, 111 Fifth Ave., New York, N.Y. 10003)

Spleen, thymus, anterior kidney, posterior kidney, liver, heart, and skeletal muscle of gray snappers (Lutjanus griseus) that had been immunized with alum-precipitated bovine serum albumin (BSA) and of groupers (Mycteroperca bonaci) that had been immunized with alum-precipitated bovine gamma globulin (BGG) were cultured. The first three organs produced detectable antibody-containing cells within 3 days; within 6 days they had all reached peak titers. Experiments in which radioactive amino acids incorporated into the antibodies and media containing puromycin (a known protein inhibitor) were fed to the cultures revealed that the antibodies were being synthesized de novo in the organ cultures. Active antibody synthesis continued for as long as 3 months after the organs were removed from the BSA and BGG-immunized fish. [3 figures, 4 tables, 17 references] LB

9.19 (1.69) STOFFWECHSEL VON PESTICIDEN IN MARINEN ORGANISMEN [METABOLISM OF PESTICIDES IN MARINE ORGANISMS]

Ernst, Wolfgang (Institut für Meeresforschung, 285 Bremerhaven, Am Handelshafen 12, Germany)
Veröffentlichungen des Institut für Meeresforschung Bremerhaven 12, No. 3, 353-364 (1970) (In German; English abstract) (Kommissionsverlag Franz Leuwer, Bremen, Germany)

II. Biotransformation und Akkumulation von DDT-^{14}C in Plattfischen: Platichthys flesus [Biotransformation and accumulation of DDT-^{14}C in flatfish: Platichys flesus], pp. 353-360.

Daily oral doses of 1 to 2 µg. of the pesticide for 1 to 2 weeks resulted in a distribution of DDT in the fish's tissues in the parts per million range. Single oral doses were absorbed within 6 hours from the gastrointestinal tract; transformation to polar metabolites did not occur in significant amounts. Thin-layer chromatography and radio scanning revealed some DDD and DDE in the tissues. [2 tables, 8 references]

III. Abbau und Speicherung von DDT-^{14}C in Plattfischen, Solea, solea, im Kurzzeitversuch [Degradation and accumulation of DDT-^{14}C in flatfishes, Solea solea, in short-term studies], pp. 361-364.

Nine days after oral administration of 1.8, 5.4, and 9.0 µg. single doses of DDT to Solea solea, up to 10% of the total dose was degraded to DDD. DDE was also evident, but to a lesser extent. No polar components were evident. At all doses, the concentration of DDT in the brain was five times greater than in all the rest of the fish. [3 figures, 1 table, 1 references] LB

9.16

and creates a circulation that not only releases carbon dioxide into the atmosphere but also encourages contaminants to settle. When the lower compartment is filled with water, a float lifts a flush bulb in the bottom of the compartment, causing the accumulated water and waste matter to be quickly flushed from the system. When flushing is completed, the flush bulb drops back into place and the filling process begins again automatically. Since the rate of air released into the upper chamber and the rate of water flowing through the partition opening can be regulated in several ways, the system can be adjusted to produce a complete replacement of the water in the aquarium as many times a day as the size and concentration of the fish dictate.

The movement of the waste matter is continuously directed toward the flush opening at the bottom of the lower compartment. Floating pellets can be dispensed at a rate that encourages maximum consumption and minimum deterioration. Impurities are removed effectively without the pellets' being removed. A steady stream of oxygenated water is sprayed into the aquarium. The water is continuously aerated. Water removed from the system can easily be filtered through gravel channels covered with aerobic microorganisms and reused a number of times. For all these reasons, great numbers of food fish can be grown in the small area required by one of these fish-growing aquaria. [10 figures] LB

9.19 FOOD IN A CARCINOGENIC ENVIRONMENT
(0.4)(0.6)

Tilgner, Damazy J. (Department of Animal Products Technology, Gdansk Polytechnic, Poland)

Food Manufacture 45, No. 11, 47-50, 87 (November 1970)

Carcinogenic substances may be introduced from a great number of sources. Several researchers over the past years have established that organic substances processed at elevated temperatures by being roasted, toasted, grilled, or cured by smoke from smoldering wood may contain carcinogens. But that agricultural products may be an even more pervasive source has not been as widely investigated. In 1968, Grimmer concluded that man ingests the largest amounts of polycyclic aromatic hydrocarbons (PAHs) not from smoked foods or grilled meats, but from vegetables and salads. The present author's data confirm the validity of Grimmer's conclusion.

Although agricultural products are being increasingly contaminated by polluted air, water, and soil, polluted air is causing the most damage. Gases, dust, and soot particles are being continually released into the atmosphere and dispersed by winds and turbulence over our food crops. Benzo[a]pyrene (BaP), one of the PAHs, as a rule is bound to dust and soot particles having a diameter of less than 300 nm. In winter, the BaP content of the air in highly industrialized areas can rise to over 400 µg,/1,000 $m.^3$ of air. Thus vegetables and grain grown in areas where the BaP-containing dust particles can settle or be brought down by rain will contain many times more BaP than will those grown in areas remote from industry. Tests have shown that the BaP content is directly related to the vegetable's growing period, surface area, and exposure to the atmosphere. For example, tomatoes, with their small, smooth surface area, were shown to contain 0.22

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9.3 THE ROLE OF FISHERIES IN THE COMMON MARKET
(1.014)

Anonymous

World Fishing 19, No. 12, 8-9 (December 1970)

This article is based on a paper presented by T. C. Jones (Assistant Chief Executive of the British White Fish Authority) at the 1970 annual conference of the UK National Federation of Fishmongers. First Jones reviews the purpose of the European Common Market, lists the constraints and privileges of the treaty signatories, and touches on some of the obstacles delaying agreement on a fisheries policy. Then he considers the possible effects of Britain's membership in the Common Market on her fishing industry.

The six original members of the Common Market (Belgium, West Germany, France, Italy, Luxembourg, and The Netherlands) agreed on a fisheries policy that became effective February 1, 1971. Britain, Norway, Denmark, and the Irish Republic (applicants for membership) had no part in formulating the policy. Yet Norway alone catches more fish each year than do the original six nations combined. In 1969, the six were net importers of fish; with the entry of the four applicants, the community would become self-sufficient in fish supplies for human consumption and would be net exporters for many varieties. The four, then, wonder if a policy that is appropriate for the six would be appropriate for the ten.

The fisheries policy agreed upon covers three facets of the industry: the operating sector, the market organization, and trade with nonmember countries. Proposals affecting the first concern fishing limits, the balanced development of the industry, and an equitable standard of living for those in it. For the first 5 years, access to inshore fishing grounds will be restricted for certain types of

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9.19 DDT RESIDUES IN CANADIAN ATLANTIC FISHES AND SHELLFISHES
(8.69) IN 1967

Sprague, J. B. (Fisheries Research Board of Canada, Biological Station, St. Andrews, New Brunswick, Canada), and J. R. Duffy (University of Prince Edward Island, Charlottetown, Prince Edward Island, Canada)

Journal of the Fisheries Research Board of Canada 28, No. 1, 59-64 (January 1971)

The amount of DDT in a variety of fishes and shellfishes from the estuarial and coastal waters of New Brunswick and Prince Edward Island, Canada, was determined. Average values, expressed in parts per million of tissue, for ΣDDT (ΣDDT = DDT + DDD + DDE) were as follows (more than one value for a given species represents the result obtained from species taken in different locations in the area): mussel - 0.05, 0.08, 0.09; giant scallop - 0.03, 0.03; soft-shelled clam - 0.01, 0.05, <0.01; oysters - 0.01, 0.02; quahogs - 0.05; American lobster (muscle) - 0.04; American lobster eggs - 0.36; Atlantic mackerel (whole) - 0.54; Atlantic salmon (muscle) - 0.05; Atlantic salmon (viscera) - 0.29; Atlantic cod (muscle) - 0.05; Atlantic cod (viscera) - 0.75; white hake (muscle) - 0.04; white hake (viscera) - 0.43; American smelt (whole) - 0.03, 0.10; winter flounder (muscle) - 0.01; winter flounder (viscera) - 0.01; Atlantic tomcod (whole) - <0.01. Apparently, the average values for DDT residues in these fishes and shellfishes were similar to or less than the DDT residues found in the same or similar species elsewhere off North America and northern Europe.

[1 figure, 1 table, 16 references] FTP

9.6 FIVE BOOKS FROM WORLD FISHING

Anonymous

World Fishing 19, No. 12, 15, 17 (December 1970)

Five books containing expert practical advice and instruction on various aspects of the fishing industry are available from Commercial Exhibitions and Publications Ltd., Riverside House, Hough Street, London S.E. 18, England.

Fish Quality at Sea is the official report of the proceedings of the 1965 White Fish Authority's conference on the design of fishing vessels and their equipment relative to the improvement of fish quality. Its 136 pages describe proven methods of handling and preserving fish on ice, by boxing at sea, by freezing at sea in the round and as fillets, and by superchilling. Russian and East German methods of transferring fish at sea are also described. The book is profusely illustrated. In hard cover, it costs £5 5s. and is post free.

Deep Sea Trawling and Echo Sounding Techniques contains the 12 articles on deep-sea trawling, the use of the echo sounder and Humber gear, and other methods of finding and catching fish that were published in 1968 and 1969 in "World Fishing." The book costs £1 and is post free.

Marketing Fish is the official report of the 2-day conference (sponsored by the White Fish Authority and the Torry Research Station) on fish marketing held in London in 1969. The book contains the full text, and the ensuing discussion, of the 20 papers presented at the conference. It has 74 pages and costs £1 5s. post free.

Fish Farm Enclosures contains the eight articles on the construction and the engineering aspects of enclosures for marine fish farms that were published in

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9.19 (8.69) RESIDUES OF DDT, DDE, AND DDD IN FISH IN THE SASKATCHEWAN RIVER AFTER USING DDT AS A BLACKFLY LARVICIDE FOR TWENTY YEARS

Fredeen, F. J. H., and J. G. Saha (Canada Department of Agriculture, Research Station, Saskatoon, Saskatchewan, Canada), and L. M. Royer (Saskatchewan Department of Natural Resources, Saskatoon, Sask., Canada)

Journal of the Fisheries Research Board of Canada 28, No. 1, 105-109 (January 1971)

Samples of fish were collected from the Saskatchewan River after a 20-year program of DDT use for control of blackfly. The muscle tissues of the fish were analyzed for their content of DDT. The concentration of organochlorine pesticide residues in the muscle tissue of the fish ranged from less than 0.01 to 0.05 p.p.m. of DDT, from less than 0.01 to 0.05 p.p.m. of DDD, and from 0.01 to 0.06 p.p.m. DDE, and from 0.002 to 0.006 p.p.m. dieldrin.
[1 figure, 2 tables, 4 references] FTP

9.6

"World Fishing" in 1969 and 1970. The book is profusely illustrated with pictures, diagrams, and tables; it contains 88 references to other related publications. Its cost is 15s. (post free).

Fisherman's Manual, which was specially prepared with the help of the White Fish Authority, is designed to provide training establishments with an approved, easily understood text book for use in training young fishermen. At the same time it can be used as a reference by experienced fishermen. With Course for Apprentice Fishermen (1964) as the basis, the text has been enlarged and up-dated to include a variety of inshore fishing methods--for example, Danish seine netting, Scottish fly dragging, ring netting, midwater trawling, and potting. The book costs £1 5s. LB

9.19 DDT IN FISH: SECOND REPORT

Turner, Neely (U.S.A.)
Chemical Abstracts 73, No. 13, 65353u (September 28, 1970)

9.6 WORLD SPACE DIRECTORY

Anonymous
Aviation Division, Ziff-Davis Publishing Co., 1156 Fifteenth St. N.W., Washington, D.C. 20005 (Spring 1971) $25

This directory has been revised to include oceanology. As before, key personnel, their job title, telephone number, organization, address, product or service are listed. The directory is divided into the following sections: United States Government (58 pages of divisions and agencies); industrial space and oceanology manufacturers; industrial representatives (domestic and foreign); space and oceanology consultants and special services; space and oceanology publications; academic, nonprofit research and professional organizations (domestic and foreign); international space and oceanology manufacturers and organizations, government agencies and departments, publications, academic and research institutes (24 countries). LB

9.19 (0.4)(0.6)

µg. BaP per kg.; leeks, 6.6; spinach, 7.4; and kale, with its open curled leaves and long exposure to the atmosphere, 20.4. Washing removes only about 10% of this dust-deposited BaP. Kale containing 18.2 µg./kg. of BaP was washed twice with water; the first wash water contained 1.6 µg./kg. and the second 1.0--leaving 15.6 µg./kg. of BaP in the kale.

Plants probably take up PAH from the soil, and they may even synthesize it. In 1965, Doerr found BaP and other polynuclears in young wheat and rye plants grown in carcinogen-free nutrient solution; and in 1966, Graf and Diehl found eight polycyclics (six of which are carcinogens) in every sample of green salad leaves, cauliflower, potatoes, carrots, apples, apricots, edible mushrooms, and wheat and rye grains they analyzed. Other investigators have observed metabolic contamination with BaP in algae, marine plankton, oysters, and barnacles.

To make the problem even more complex, carcinogenic contaminants remain in the manufactured products. The author discusses the PAH content of crude and refined vegetable fats and oils, and the adverse effect of processing vegetable products by direct combustion heating. He points out that France and Switzerland forbid drying by direct combustion gases, and West Germany labels it inadvisable. He suggests that using gas as a direct heating source in the thermal processing and smoke curing of fish and meat products should be discontinued. He concludes his report by considering the amount of BaP the average person ingests, efficient procedures for remedying air pollution, and the complex question of the connection between food and cancer.
[5 tables, 1 photography, 47 references] LB

9.3 (1.014)

fishing to populations depending primarily on coastal fishing. Thereafter, all community vessels will be completely free to fish right up to the beaches of all member states.

Apparently, responsibility for the market organization rests with producer organizations within the member states. Where such organizations do not exist, their formation will be encouraged and subsidized. Although a level of guide prices for the main varieties of fish will be determined centrally for the whole community, the fish being graded according to defined standards of quality, producer organizations may fix withdrawal prices for fresh fish at a figure lower than the guide price. Fish not sold for human consumption at the withdrawal price will be consigned to fishmeal plants. The producers will also pay the catchers, the money coming from the fish that are sold and from community funds, should that be necessary to meet the minimum price set for the grade and variety.

Imports of some varieties of fish from nonmember countries are to be subject to a reference price, levies, or some form of compensatory tax. Details on this aspect of the policy are not available yet.

Jones says that until the policy is in operation, the effects on Britain's fishing industry is largely a matter of conjecture. However, he is deeply disturbed by the proposed freedom of access to some of Britain's inshore areas. On the other hand, Britain's deepwater trawlers will have access to grounds formerly closed to them; their right to land fish and establish bases in other countries can but lower costs and improve quality; and abolition of trade barriers should benefit exporters of boxed and frozen fish. Fishmongers, too, may benefit, for although the price of fish almost certainly will increase, it will not increase as much as the price of meat. Hence, fishmongers will have increased opportunity to attract some of the British housewife's food budget. LB

9.19 PERSISTENT PESTICIDES IN THE ENVIRONMENT
(9.6)

Edwards, C. A.
Butterworths, 78 pp. £5
Reviewed by Ian Prestt
New Scientist and Science Journal 49, No. 739, 391 (February 18, 1971)

About 80% of this volume, one of the CRC Monoscience Series produced by the Chemical Rubber Co. of America, is devoted to organochlorine residues in the physical environment and in biota. The reviewer suggests that the author of this book, in a very partial way, seems to be trying to redress, with his own generalized assurances, the balance between the benefits and the dangers of organochlorine insecticides. For example, after reporting their sublethal effects on fish--lowered resistance to disease, subnormal feeding rates, degeneration of reproductive capacity, thickening of gill membranes, lack of osmoregulation, lowered blood counts, brain damage, reduced body weights--and citing evidence of fish kills, he concludes that pesticides probably will not seriously deplete fish populations. Throughout the book, says the reviewer, are similar reassurances based on unsupported conclusions. [3 figures, 22 tables, 322 references] LB

9.19 SEASONAL INSECTICIDE RESIDUE CHANGES IN TISSUES OF FISH FROM THE GRAND RIVER, ONTARIO

Kelso, John R. M., Hugh R. MacCrimmon, and D. J. Ecobichon (Univ. Guelph, Guelph, Ontario, Canada)
Chemical Abstracts 73, No. 15, 75779b (October 12, 1970)

9.3 DEPARTMENT RELEASES 1971 EDITION OF "TREATIES IN FORCE"
(9.4)

Anonymous
Department of State Bulletin 64, No. 1657, 464 (March 29, 1971) (Washington, D.C.)

The Department of State on February 12 published "Treaties in Force: A List of Treaties and Other International Agreements of the United States in Force on January 1, 1971."

This is a collection reflecting the bilateral relations of the United States with 155 countries or other political entities and the multilateral relations of the United States with other contracting parties to more than 370 treaties and agreements on 82 subjects. The 1971 edition lists some 200 new treaties and agreements, including the fisheries agreements with Japan, Poland, and the U.S.S.R.

The bilateral treaties and other agreements are arranged by country or other political entity and the multilateral treaties and other agreements are arranged by subject with names of countries which have become parties. Date of signature, date of entry into force for the United States, and citations to texts are furnished for each agreement. This edition includes citations to volumes 1, 2, 3, 4, and 5 of the new compilation entitled "Treaties and Other International Agreements of the United States of America 1776-1949" (Bevans), which is now being published by the Department of State. Reprinted in part

COMMERCIAL FISHERIES ABSTRACTS VOL. 24 NO. 6 PAGE 29

9.2 DETERMINING PARAMETERS FOR POPULATIONS BY USING STRUCTURAL MODELS

Henny, Charles J. (Department of Fisheries and Wildlife, Oregon State University, Corvallis, Oreg.), W. Scott Overton (Department of Statistics, OSU), and Howard M. Wright (Department of Fish and Wildlife, OSU)
Journal of Wildlife Management 34, No. 4, 690-702 (October 1970) (The Wildlife Society, Suite S-176, 3900 Wisconsin Ave., N.W., Washington, D.C. 20016)

The method described here for calculating the parameters necessary for maintenance of stable populations depends on a knowledge of the population mortality rate, the age at which the species reaches maturity, and the recruitment rates or age ratios in the population. Basic to the approach for determining population characteristics is the concept of a stable population; evaluating information about natural populations involves calculation of the necessary productivity and the allowable mortality required for maintenance of a stable population, the annual rate of change in population size, and the age ratios that make for stability in the population. Formulas for these general relations and for several special cases are given, as are tables showing the production required to maintain a stable population with the simpler, more common mortality and fecundity schedules. The authors note that population increases or declines can be related to changes in production, in survival rates, or both if mortality-rate estimates are available for several time periods. [5 tables, 21 references] LB

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9.6 CRYOGENICS SAFETY MANUAL
(3.234)

Safety Panel of the British Cryogenics Council
Published by the British Cryogenics Council, 122 pp. £2 to members of associated societies; £3 to others; 1s. 6d postage
Barrie Ricketson (reviewer)
New Scientist 49, No. 734, 82 (January 14, 1971)

This five-part manual is the British Cryogenics Council's first publication since its founding in 1967. It is a pool of information contributed by representatives of several industrial firms that are concerned with low-temperature processes. It covers plant operations, low-temperature materials, testing procedures, personnel training and discipline, and emergency treatment procedures following accidents; both general safety requirements and the specific safety measures required for handling oxygen, nitrogen, argon, liquefied natural gas, hydrogen, ethylene, and ethane are included.

The manual is illustrated; however, it has no alphabetical index. LB

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USE OF FUNDS FOR PRINTING THE ABSTRACTS WAS APPROVED BY THE DIRECTOR OF THE BUREAU OF THE BUDGET APRIL 18, 1968.

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REPRINTS of articles or other material from which abstracts are drawn should be requested either from the author or from the publishing outlet. Addresses of these outlets are printed in *Commercial Fisheries Abstracts* about once a year.

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